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Devoted to Elementary Science in The Schools

OFFICIAL ORGAN OF THE

American Nature-Study Society

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JANUARY-FEBRUARY, 1922

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JOHN HENRY COMSTOCK
Emeritus Professor of Entomology, Cornell University

AND

ANNA BOTSFORD COMSTOCK
Professor of Nature-Study, Cornell University

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THE NATURE-STUDY REVIEW

Volume XVIII, 1922

ANNA BOTSFORD COMSTOCK
SECRETARY-EDITOR
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THE
NATURE-STUDY REVIEW

VOL. 18 JANUARY-FEBRUARY, 1922 NOS. 1-2

WILLIAM GOULD VINAL

Elected President of the American Nature-Study Society at the Toronto Meeting

William Gould Vinal

ANNA B. COMSTOCK

William Gould Vinal, who was elected President of the American Nature-Study Society at its annual meeting held in Toronto, is no stranger to the readers of the REVIEW, for he has been for

several years a valued contributor. He was born in South Scituate, Mass., November 29th, 1881. He is a descendant of William Bradford, Governor of Plymouth Colony, and of Peter Sears, a Captain in the war of the Revolution. His grandfather was Captain Abel Vinal, master of a fishing vessel which sailed many years from the port of Cohasset. His parents lived on a farm in South Scituate (now Norwall) and like most farmers of that region were hardly in circumstances that would be termed affluent. As a child he was weak and sickly but he had a mother who knew how to give him the right kind of care, and he grew into a strong stalwart man. His parents were both fond of the out-of-doors and he had their companionship and interest in his many boyish enterprises. He kept hens, ducks and pigeons and raised wild geese for decoys for a rich shoe manufacturer; he had to mow fresh grass every day for the geese and at the end of the season he received a pair of shoes for this labor. He made pets of his chickens and taught them many interesting tricks; but his special pet was a Spitz dog called Dandy, who was his inseparable companion. Dandy would slide down hill with his master and play hide and seek with him, never starting until the signal was given; he also was a help in getting the cows, catching chickens and in hunting. Among young Vinal's poultry were "frizzled fowls," a rare breed that always took first prizes at the County Fairs.

His education began in "district school" but he graduated from a high school in 1899; later he entered the Bridgewater Normal School and graduated there from a four year course in 1903. He received the degree of S. B. from the Lawrence Scientific School in 1906 and the degree of A. M. from Harvard in 1907. During his entire school career he earned money in various ways; while he was at Bridgewater he was librarian for four years; while at Harvard he waited on table at Randall Hall and was assistant in various laboratory courses.

One of the most interesting phases of Mr. Vinal's school life is what he did with his vacations. Each year he chose to do something different from the work of the preceding years in his efforts to earn money for school expenses. In 1898 he worked on a neighboring farm at 7½ cents an hour. The next year he drove a vegetable cart to Nantasket Beach, starting at four

o'clock in the morning and getting home at 10 or 11 P. M. every day but Sunday. The next summer he worked on a milk farm in Connecticut, milking early in the morning and working on the farm the rest of the day until milking time in the evening; he went home in the fall via New York City with his entire summer's earnings of $19. The following summer he ran an ice cream store at Queen Anne's Corner, walking four miles to the store and back every day; the next summer he presided over a soda fountain at Nantasket Beach beginning work at seven A. M. and continuing until 11 P. M.; he did this eighty-four days without a day off; he was allowed one night a week off but was so tired that he spent his spare time in sleep; he received for this $1.00 per day and board. During the two succeeding summers he worked for the Nantasket Steam-boat Co., first as gateman and later as freight clerk. Following his graduation from Harvard he spent seven summers as Biologist for the Massachusetts Fish and Game Commission. Four of these summers he worked on shell-fish, one in making a fishery survey of Buzzards Bay, and two on the Biological Survey of the fresh water ponds off Cape Cod. Since this time Mr. Vinal has found an absorbing occupation for his summers in running his very successful enterprise as Director of Camp Chequasset, a Nautical Camp for girls near Wellfleet on Cape Cod.

As a teacher Professor Vinal has been very successful. In 1907 he was appointed the head of the department of Geology and Biology at the Marshall College State Normal School at Huntington, W. Va., a position which he held for three years. In 1910 he was made Instructor in Geography at the Salem, Mass., State Normal School and the following year was called to the Rhode Island College of Education at Providence, the position which he still retains, as the head of the Dept. of Nature-study. His well earned reputation as a teacher who is at once thorough and inspirational has spread beyond the bounds of New England and to the writer's knowledge, he has received several tempting offers from Western institutions. However, Rhode Island appreciates him and has been able to retain him; and his work has counted for much in the educational system of that State. His Arbor Day Manuals are among the most remarkable of any in the United States. He is President of the R.I.Field Natural-

ists' Society and has been President of the Providence Franklin Society, a society devoted to science and which is over a hundred years old. In 1917, he was elected to Sigma Xi by the Chapter at Brown University, where he is studying for his Doctor's Degree. He is the author of various scientific papers and of *A Guide for Laboratory and Field Studies in Botany* published by P. Blakiston, Sons and Co.

In 1908 he was married to Miss Lillie Hale Downing who was one of his schoolmates at the Bridgewater Normal. Mrs. Vinal is a woman of charming personality and has been a helpmeet to her husband in the truest sense of the word. They have two children, a boy and a girl. The writer, who was once privileged to be a guest in the Vinal home was greatly impressed by the home training these children were receiving. For the development of responsibility, independence and mental and moral integrity it seemed ideal.

The American Nature-study Society is fortunate in securing Professor Vinal for its President; and Professor Drushel whose efficiency in this office has won the gratitude and admiration of us all, may feel well content to pass the work over into such able hands.

John Caspar Branner

In the death of Dr. Branner, which occurred at Stanford University on March 1st, the world of science and a wide circle of devoted friends have suffered an irreparable loss and the NATURE STUDY REVIEW the loss of one of its most delightful and valuable contributors. As a geologist Dr. Branner had won a world wide reputation; his work on the geology of Brazil is perhaps the most important of his writings. He was especially successful as a teacher, for he was a friend as well, and knew how to help build up character in the pupils while he was instilling knowledge. The love and respect given him in such overflowing measure by those who studied with him form a living monument to his memory.

Sky Phenomena in the Upper Forties

W. H. Tuke

Principal of High School and Mining Institute, Haileybury, Ontario

In "Modern Painters," written almost eighty years ago, John Ruskin complained of the lack of interest in sky phenomena. "It is a strange thing," he wrote, "how little in general people know about the sky. It is the part of creation in which Nature has done more for the sake of pleasing man, more for the sole and evident purpose of talking to him and teaching him, than in any other of her works, and it is just the part in which we least attend to her." Even with such prophets as Ruskin to sing the beauties of this temple of God's great Out-of-Doors, can we say that after three-quarters of a century people in general pay any more or even as much attention as they did in his day? The ever-increasing murk of smoke and fog that hovers above our cities; the growing brilliancy of artificial lights by night; and the tendency to seek our pleasures indoors, combine to shut us off from much that delighted and inspired alike the shepherds on far-off Syrian hills and the restless aborigines of our own continent: so much so that our much-tutored minds no longer "see God in clouds or hear Him in the wind."

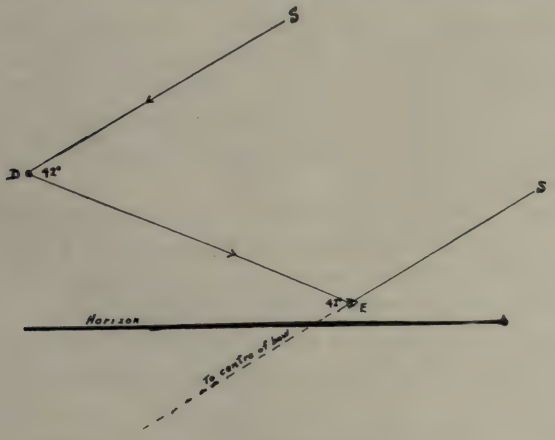
It is natural, too, that even the enthusiastic Nature student should more often devote his time and interest to the living objects of creation rather than to inanimate things. Life in all its forms, must always possess greater interest for us than non-living things. There is a satisfaction, too, in the definiteness that may be attained in investigating specimens that may be captured, and handled, that is lacking in the study of the sky. The latter is necessarily illusory. We can not even define it exactly. Just as a real-estate holding may be described as a pyramid whose base is the area specified in the title-deeds, and whose apex is the centre of the earth, so the sky is that infinite frustrum of a cone whose smaller end is bounded by our visible horizon. Foreground of atmosphere, middle distance of solar system, and background of unfathomed stellar space are superimposed with little to reveal to the eye which is which. Thus

it is that in the popular mind errors and myths still persist: the crescent moon pours water from its down-pointing horns, and the zodiac smiles or frowns on agricultural activities.

The phenomenon of the moon rising partially eclipst one evening last October, while the sun was still visible above the horizon brought forth a series of letters from correspondents to the Toronto (and no doubt other) newspapers. The flat-earth, sun-do-move, school of thought still has many adherents, even among those apparently well-educated. One letter suggested electrons and Einstein's theory as alternative explanations of that eclipse, and proceeded to discuss other phenomena, mentioning a case of driving thru a rainbow and hearing sounds of crackling glass. Within the past fortnight two different people, both intelligent, one a university graduate, have helped me in preparing this paper by describing the two following incidents: (1) Two moons seen at same time, one rising the other setting. Said to have been seen in Saskatchewan about four A. M. by several people; (2) Four rainbows seen at once with the sun in the centre. Back in the spring of 1910, when many were watching for the first appearance of Halley's comet, I myself was awakened one morning by a friend who pointed out to me a giant comet-like appearance in the sky. It reached from a point in the eastern horizon clear across the zenith and spread out a great tail half way down the western sky. Not doubting that it was indeed the comet, I informed the students in the school and they spread the good news so that we had all the community wide awake the next morning at four o'clock. But, tho the sky was perfectly clear there was no comet, nor the next morning, nor for over a month after that. When the authentic Halley's made its appearance it was a small and pallid affair compared with its splendid predecessor. What was the latter? Our meteorological bureau expressed the opinion that it was an auroral arch, though the latter are rare at the latitude of Toronto and especially at that early hour in the morning. My other friend's four rainbows, on closer questioning, resolved themselves into the two lower arcs of one bow, and their reflection in the calm water of a lake. As they appeared around the sun, I presume that they were really "sundogs" or parts of a halo, not parts of a real rainbow. As to the simultaneous appearance of two moons, I can venture no opinion.

Rainbows

Even the most honest and experienced observers at times fall into curious errors. The late John Burroughs wrote an interesting article called the "Unapproachable Rainbow" which appeared in the *Atlantic Monthly* of July, 1920. In it, he effectively answered statements made by other correspondents who claimed to have walked or driven through rainbows, as the Toronto writer referred to above did. In so doing, however, he stated that rainbows can not be seen between the hours of nine A. M. and three P. M. This statement is incorrect even for latitudes much south of that in which Mr. Burrough's home was located, but it is especially so for the higher latitudes. On September 30th, 1920, I observed a fine bow, almost due North, at 1.15 P. M., and have seen others within the hours mentioned. The physical conditions necessary for the formation of a rainbow are that the sun's (or rarely the moon's) rays shall fall on drops of water, be refracted, then totally reflected on the inside of the drop, then refracted again, emerging at an angle of about 42 degrees from the direction in which they entered. Obviously, these drops may be located anywhere on the arc of a circle whose centre



The bow may be seen if the sun is not more than 42° above the horizon.

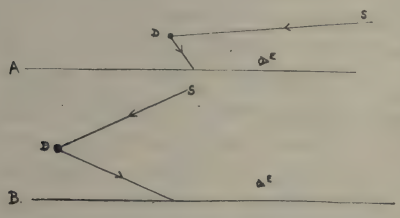
is in line with the observer's eye and the sun, and which has an angular radius of about 42 degrees. Whenever, then, rain is falling, and the sun is shining, and is not over 42 degs. above the horizon, we may have a rainbow. (Sketch) At the latitude at

which I live, about 47½ degs. north, the sun is continuously low enough to produce a bow almost from the fall to the spring equinox. We can, and do, have bows even at noon. Of course, our climate is such that for most of this period rain does not fall, so mid-day bows are not common. Even with the sun at greater altitudes bows may be seen where the sky is not the background, as in the gorge at Niagara Falls. Incidentally, the bows at the Falls are another source of frequent errors. I have heard travelers declare, and have seen artists' sketches showing, that several bows appear simultaneously over different parts of the Falls. They do not refer to the primary and secondary bows, but to distinct primary bows seen over different places.

Mr. Burroughs also corrected stories from correspondents which stated or inferred that rainbows move. Certainly the bow must always keep the same relative position to the observer and the sun, but in the rainbow mentioned above as occurring near the noon hour there was an interesting and beautiful appearance of movement. The bow was low and was broadened by numerous supernumerary bands and a distinct waving or pulsing movement of the color could be seen. It gave a very fair imitation of the field of "Old Glory" waving in the breeze. Now, what was the cause of that? The sun was shining through rifts in the clouds forming those peculiar spoke-like streamers and as a result the area in which the bow appeared was not illuminated uniformly. The bow thus was made of alternate lighter and darker patches, and as the clouds rapidly shifted, the bow waved in the manner described.

Can there be rainbows without rain? It is a common sight with us to see a bow, or rather the abutments of a bow, appear in the east, remain there an hour or more, both primary and secondary bows being clearly outlined, and all the time a perfectly clear sky with no sign of rain or cloud. To explain: I have the advantage of living on an elevation overlooking Lake Temiskaming which spreads out from six to twelve miles to the east, and permits an uninterrupted view of hills for twenty or thirty miles to North, East, and South. Local thunderstorms arise, far away in Quebec province, too far for clouds or lightning to be seen or thunder to be heard. Yet the falling raindrops catch the sun's rays, and, given the proper angle, we see the bow.

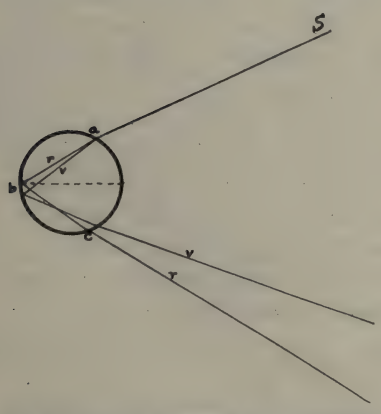
While as a rule bows can be seen for only a short time as a storm is receding or approaching, these more distant bows are visible for the whole duration of the storm, giving an opportunity of prolonged study. Another interesting feature of these bows is that sometimes clouds, nearer, and probably lower, often drift in between observer and bow temporarily eclipsing portions of the colored band.



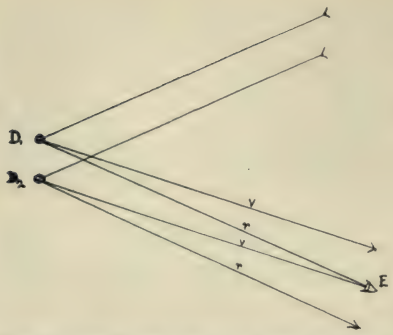
If the sun is very low (A), or the rain falling far away (B), the bow may not all be seen at E.

Why is it that in the case of the distant bows, and also bows formed when the sun is low in the sky, only the lower arcs can be seen? It will be seen (sketch) that in these cases the light rays after making their 42 degree turn in the drops do not reach the observer from points straight opposite the sun, so the corresponding part of the bow is not visible.

Violet rays are more refrangible than red rays, yet, as there are two refractions, one on entering the drop, the other on leaving it, and as these are in opposite directions, and as the red ray after the first refraction and reflection makes a greater angle with the normal to the surface of the drop than does the violet ray (sketch) the total refraction of the red is greater than that of the violet. In other words the red ray emerges from the drop about two degrees farther from its entering direction than the violet ray, that is about two degrees lower in the case of drops that form the top of the bow. Why, then, does the red appear on the top of the bow? We do not see all the colors from the same drop. With two degs. difference in direction the red rays that enter the eye must come from



The light-ray is refracted at *a*, reflected at *d*, and again refracted at *c*.



Thus the red rays emerge from the drops lower than the violet rays, the eye sees the red on top.

drops that are higher than those from which the violet rays come, so the red part of the bow appears on the outside.

Reverting now to those spoke-like rays of the sun previously mentioned, formed when the sun is shining through broken cloud masses, Mr. Burroughs wrote that he had never heard a satisfactory explanation of their radiating character. When a sunbeam enters a darkened room through an aperture its rays do not diverge, i. e., according to Mr. Burroughs but are parallel, while the rays passing through a cloud opening spread out like a fan. The first of these statements is obviously incorrect, as can be proven by anyone who will take the trouble to measure the opening and then measure a cross-section of the beam a few feet from the opening. Without going into any more difficult physical explanation, the fact that the sun is not a point of light but a disc of appreciable size, being roughly one one-hundredths in diameter of its distance from us, is sufficient to account for the spreading of the rays that are commonly spoken of as parallel. Thus the rays from different parts of the sun's disc do not strike the aperture at the same angle and the so-called beam diverges slightly. But the light streamers seen in the cloudy sky do not diverge only *slightly* but like spokes of a wheel with the sun at the hub. Mr. Burrough's failure to explain this phenomenon is evidently due to insufficient observation, for, writing elsewhere, he made the statement that these rays are never seen except between the observer and the sun. Now, one of our most striking and beautiful sky displays is just the opposite of this. As the sun is sinking low in the west, sometimes its rays will break through clouds overhead and send long horizontal streamers across the lake, making a huge fan-like illumination in the eastern sky, and the rays converge not *toward* but *away from* the sun. The explanation that this suggests is that the apparent direction of

these streamers is an illusion of perspective. The lower ends of the streaks of light are much nearer than the upper ends, or in the case of the horizontal rays described, the parts overhead are nearer than the parts at the distant horizon, so in common with all parallel or nearly parallel lines they appear to recede to a vanishing point, in the one case toward, in the other opposite the sun. This perspective illusion appears to be also the cause of the fan-like distribution of clouds sometimes seen near the horizon. Really the clouds are ranged in nearly parallel formation, blown thus by steady wind currents, but to the eye they appear diverging.

The Aurora Borealis

But it is in the advantageous position for viewing the Aurora Borealis that our North Country excels. To one accustomed to the infrequent and meager displays of more southern latitudes the first sight of a real northern auroral outburst is an awe-inspiring spectacle. The lights cease to be mere "Northern" lights, for east, and west, and south are full of them. Let me offer here my apologies to any real Northerner who may be present and who may think it presumptious of a mere 47 degree man to attempt to describe these wonderful manifestations. I can only trust that he may add to my account. It is a matter of regret that the psalmists and poets of old who felt the inspiration of the starry heavens could not also have dwelt under the Northern lights to have described them fitly. Service, poet of the Yukon, has attempted to do so in his Ballad of the Northern Lights:

> And the skies of night were alive with light with a throbbing thrilling flame,
> Amber and rose and violet, opal and gold it came.
> It swept the sky like a giant scythe, it quivered back to a wedge;
> Argently bright it cleft the night with a wavy golden edge.
> Pennants of silver waved and streamed, lazy banners unfurled;
> Sudden splendors of sabres gleamed, lightning javelins were hurled.
> There in our awe we crouched and saw with our wild uplifted eyes
> Charge and retire the hosts of fire, in the battlefield of the skies."

And again:

"The Northern Lights in the crystal nights came forth with a mystic gleam.
They danced and danced the devil-dance over the naked snow;
And soft they rolled like a tide upshoaled with a ceaseless ebb and flow.
They rippled green with a wondrous sheen, they fluttered out like a fan;
They spread with a blaze of rose-pink rays never yet seen of man.
They writhed like a brood of angry snakes, hissing and sulphur pale
Then swift they changed to a dragon vast, lashing a cloven tail.
"They rolled around with a soundless sound like softly bruised silk
They poured into the bowl of the sky with the gentle flow of milk.
In eager pulsing violet their wheeling chariots came,
Or they poised above the Polar rim like a coronal of flame.
From depths of darkness fathomless their lancing rays were hurled,
Like the all-combining searchlights of the navies of the world."

Some authorities credit us in Northern Ontario with an average of thirty displays annually. My impression is that we have many more than that, but impressions are poor substitutes for definite statistics. At any rate, it is a well recognized fact that we have many more opportunities of observing the Aurora than there are in the same latitude in Europe. Our isochasm or zone of auroral frequency is the same as that of Norway or northern Scotland, tho our latitude is south of any part of Great Britain. There have been few opportunities, however, for studying the lights this past fall, both because there have not been many occurrences of the phenomenon, and also because there has been much cloudy weather. From August 30th to September 6th we had fine displays every night, the most brilliant being on the night of September first.

Aurorae are sometimes classified into seven classes, namely: Arcs, bands, curtains, rays, coronae, patches, and diffuse form. Is this not a needlessly complex division? The bands appear to me to be similar to the arcs; the rays and curtains to be similar except for intensity; coronae to be made of curtains and rays, and patches either parts of bands or local diffuse areas. In southern Ontario we rarely see anything but the rays; in the north the rays usually rest on a foundation, if such a term may be applied to anything so unsubstantial, of arc or curtains. Do the rays seen farther south also connect with arcs too low to be seen above the horizon, or do these manifestations in the higher atmospheric strata occur farther south than the other forms?

When we have a really brilliant display, the forms usually appear in a regular sequence. First an arc will appear low in the northern sky. This gradually rises, that is, moves south, becoming apparently larger and more clearly outlined as it approaches. The space below the arc appears darker than the rest of the sky, probably by contrast. Other arcs appear and follow the first one. Portions of the arcs widen and become brighter, and these areas spread rapidly. A distinct pulsing movement, usually from West to East, appears. The arcs then curve and loop and break in a great variety of forms, forming great horseshoe loops, and circles, or rather cones. The broader areas become striated in appearance; long, dancing, shafts shoot up to the zenith, advancing, receding, flashing brightly, fading quickly, justifying the habitants appellation "marionettes." The arcs are usually devoid of color except pale yellow or green, but the curtains frequently show other hues, most often rose, occasionally crimson or violet. The color is not a stable feature. So far as I have observed, it does not appear except when there are rapid lateral, that is east and west, looping movements, and the color appears on the angles of the curves, suggesting that it may be due to some such cause as interference when the light from one part is seen through the dense lattice-work formed by another part in front of it. Gradually the movements subside, the colors fade, the brilliancy decreases, and the sky settles into a diffuse glow, brightened now and again by a patch or a solitary ray.

In March 1920 the greater part of the continent was treated to an exhibition of what *we* see frequently, and *our* display was

correspondingly more magnificent. On this occasion, the sequence of forms differed from that just described. The first manifestations were curtain forms, hung low in the south-eastern sky, resembling in appearance great palisades of vertical golden bars. These rapidly rose in the sky, increasing in size and brilliancy, swinging and writhing, till they swung across straight overhead, revealing themselves as thin, almost vertical, films. Throughout the earlier part of the evening they swayed back and forth, seeming to hang suspended from long, pale, threads that reached upwards to a point near the zenith. Observers from such distant points as Alabama and California saw these rays, and all described them as proceeding from near the zenith. Now, if the aurora is a purely atmospheric phenomenon, with the greatest recorded height about 140 miles, how could observers in Northern Canada and Southern States all see the same point from which the rays appeared to proceed? Must we not again explain this appearance of radiation by the simple explanation of perspective illusion? Could the distant observers see the same rays? Apparently not. In different places different sets of curtains were seen and as the rays were nearly parallel and vertical, following the earth's lines of magnetic force, these rays appeared to converge towards their upper extremities. If the lower edges of the curtains were one mile high, for example, and the upper one hundred miles high, the upper ends of two rays would appear almost to meet, since they would seem only one one-hundredth as far apart as at the lower ends. It would be interesting if a number of observers would report on displays such as the one mentioned, so that data might be obtained as to the rate of travel, the differences in appearance of a given part from different view-points, and the distance at which particular parts can be seen.

I have never heard any sound from the aurora, but have heard one whom I regarded as a fairly reliable observer claim to have heard it, described as resembling the swishing of a whip-lash through the air. Note Service's reference to "a soundless sound like softly bruised silk." I should like to hear from others who have noticed it; also from anyone who has personally seen an aurora between himself and any terrestrial object, such as a building or hill.

A common error that casual observers make about the Northern Lights is to assume that the displays are centered about the North

Pole or, at any rate, about the magnetic pole. As a matter of fact, the zone of greatest frequency is far south of the pole, and north of this zone the displays are seen most often in the southern sky. Another belief, sometimes pictured in artists' sketches, is that the rays proceed from a point in the northern horizon, spreading out fanwise. As stated before, they are really almost vertical, following approximately the lines of magnetic inclination or dip. The aurora itself, of course, displaces somewhat the mean position of these lines. The form of the arcs, and the radiating character of the rays, not from the horizon but from near the zenith, would seem to be due entirely to perspective effects.

The close concurrence between times of greatest auroral and greatest sunspot frequency seems to establish some probable cause and effect relationship between these two phenomena. The infrequency of the displays of the past season is to be considered in connection with the fact that we are now near the minimum period of the sun-spot cycle. I do not pretend to understand, much less to explain the theories advanced along this line, tho the picture of electrons in countless numbers hurtling thru space and arranging themselves in mathematically beautiful precision along the earth's magnetic lines, and all because of some eruption on the sun, is fascinating enough. But, in the little reading I have done on this subject, I have the feeling that scientists are overlooking some possible closer relationships. For example, is there any connection between aurorae and prevailing weather conditions? My own observation is that the displays only occur under certain conditions. Of course, a clear sky is necessary for visibility; tho the lights may be seen at times through breaks in the clouds, or even under high clouds. But I do not recall ever having seen an aurora on a sultry night, or just after a period of rainy weather, tho the sky is often exceptionally clear then. The displays do occur during local thunderstorms, however. One of the finest sights I have seen was in the autumn of 1920, when, with a bright moon shining above, a heavy thunderstorm with vivid lightning was in progress to the south, and a splendid showing of Northern Lights with pronounced color effects could be seen in the North and West. I have found it possible to predict with a considerable degree of accuracy the near-future occurrence of the Lights, tho whether

this is done from a sub-conscious summing up of the known favorable factors, or whether from some special sensitiveness, I do not know. Again, after the aurora has settled into the diffuse form, as it usually does, the sky as a rule becomes clouded. Possibly this is due to moisture condensing on electronic matter.

Why are the lower edges of arcs, bands, and curtains, usually well-defined? One does not wonder that the upper ends are not clearly marked, but often the lower edges are as clear-cut as if they had been sheared smoothly off. Do the edges represent the division line between two different strata of air? As I have mentioned before, I have never seen color effects except when there was rapid lateral motion; and so far as I have noticed this always and only occurs when there is or has been a strong wind. Can local air currents affect the aurora? Is it possible that friction between two air strata has anything to do with the phenomena of the Lights? Why do the displays usually occur between eight and ten o'clock in the evening? Why are the arcs of considerable breadth, while the curtains appear to be but thin films? These and a host of other questions challenge the observer who watches these mysterious lights. I shall be pleased to hear from others their observations, and especially to find if they concur with what I have said in regard to the connection between weather and the aurora, and to wind and color effects.

As a Nature student I can claim neither extensive observation nor original theory. I can only hope to avoid on the one hand the obvious errors such as those quoted, and on the other hand the extreme of the mathematical physicist who thinks it hardly worth his while to look at the sky at all, since from his inner consciousness he can invoke an algebraic formula that is all-sufficient. Nature has been somewhat less generous with flora and fauna in our great Northland than in some other places, but she has in a large measure compensated us by giving us wide horizons of startling clearness, with rippling lakes that mirror skies of sapphire and opal and rose. To watch these at sunrise and at sunset and through the long nights of winter or the short nights of summer is to feel them and to love them; to attempt to describe them in pale prose seems to border on sacrilege.

The Natural History of the Farm in its Relation to the Development of the Aesthetic

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In discussing the natural history of the farm in its relation to the development of the aesthetic, I shall confine myself rather rigidly to the farm. In so doing I hope I may be able to give those who teach the farmers of to-morrow an attitude toward the natural environment of the farm that will make them true interpreters of the aesthetic possibilities there.

This field is especially interesting to me because all my youth up to manhood was spent there, and more particularly because man in one of his fundamental activities is inseparably associated with all that transpires there. The contemplation of nature on the farm would have little solace or beauty for me without the human touch.

The natural history of the farm, as it affects the farmer, is made up of sentient and insentient nature. In the former are centered all the experiences relating to the animals that make their abode there, and hence are largely circumscribed by the environment of the farm, while in the latter the experiences may be as wide as the eye can see and the mind can grasp.

Many of the farmer's experiences with the animals do not tend to elevate his sense of the beautiful. 'Tis true there is a certain fine gratification in looking at the lines of a well-set-up horse, but I do not think that stock judging would make much of an appeal to a poetic nature. I fear, however, it is this kind of beauty the majority of farmers see in their domestic animals, if indeed they are fanciers at all. Nevertheless, if the farmer for the moment forgets to count points, that is, ceases to be technically scientific, he cannot help but see much beauty in the symmetry and lines of a well developed horse. We have all admired him, suddenly arrested in his galloping about the pasture, and posing, so to speak, for a moment, while the wind blew his shaggy mane over his shapely head. We may also have been attracted by the picture of strength in his full, tense muscles as he strained

at a load. And so it is with other animals. Sometimes it is beauty of form and then again a quality quite dissociated from it. We would scarcely say that the lamb of a few days has beauty of form. Its thick, stubby legs are all out of proportion; and yet the lamb is a favorite with the artist. How careful he is to portray that peculiarly playful and innocent expression which only lambs can have, and which so redeems their ill proportions that we are tempted to smile at them with good humored indulgence. These attractive characteristics are not peculiar to domestic animals only. What is more appealing than a little racoon? I well remember two young ones strolling side by side into our front lawn on the farm. A description of those furry little lumps as they toddled along the path toward the house is quite beyond me. Their sharply pointed noses, agreeably setting off their plump little cheeks did full justice to their still innocent, though cunning eyes, not to mention the good natured set of their broad, pointed ears.

Similarly many other examples could be given but time does not permit. Let us consider the ways of these animals. In their playful moods they often arrest us in our work. We are amused by their antics. We may smile or even laugh and we go about our task the happier for our experience. On the other hand, however, they often possess characteristics that by no means amuse us, nay rather the reverse, and right here let me tell you that a contemplative sense of humor may save the day and bring forth a smile instead of an imprecation, may cultivate in us strong and beautiful traits instead of making us servile, weak and ridiculous. One example will suffice to illustrate my point and I shall give it almost verbatim, as expressed by a local lover of nature. I cannot improve on it.

"Cows certainly think, but only when they have the proper environment. They don't think all over the place like college professors and eminent people generally. Cows can spend days and days without thinking, but when the conditions are right they think unutterable things, and the object that inspires them to their loftiest flights is a gate. You have only to look at them and notice the awful solemnity of their magnificent eyes to know they are not thinking of any ordinary matter like the beef trust, or the high cost of hay. But it is not enough to have a cow see

a gate to start her thinking. You must try to drive her through it. In fact, you must have a herd of them and it usually works out this way. After you have run yourself out of breath gathering the herd, the boss will take the lead and the skittish young cattle will be bringing up the rear. As soon as the boss gets into the gate where none of the others can pass, a great idea will strike her and she will stop to chew her cud and think it over. You will probably start yelling at her, but nothing can interrupt her profound thoughts and your yelling will only disturb the young cattle and start them scampering around the field. In all probability you will start throwing sticks and if your aim is good you may jolt her through the gate. Then you will have to gather the young cattle again, and when your flock is at the gate once more you will find that the deputy boss becomes seized of a great idea when she reaches the middle, and so the whole process has to be gone over again."

This particular phase of aesthetic interpretation borders closely on another of still more fundamental import—that of sympathy. We cannot observe any animals, tame or wild, without being impressed by the fight they put up in the struggle for existence. We interpret it in terms of our own struggle, but in a sense theirs is the more pathetic, not knowing what it means and not reaping any spiritual compensation. How at our mercy they are, and how cold that mercy often is. Those of us who recognize this struggle, whether it show itself in brute force or in cunning, cannot help but interpret it in terms of sympathy. Burns well expressed this in his poem to a field mouse:

I must confess it is beyond me to understand how any man can go out and find pleasure in shooting, that is killing, any animal that has been unwary, or trusting enough not to make its escape good. When I look from the eyes of the hunter gloating over his prey, into those now fast glazing over in death, I fear I cannot tell which is the brute. Kill we often must for our protection but we cannot afford to do it ruthlessly.

From this field of "earth born companions" we shall pass to another where we may say nature is in its humbler beginnings—nearer the first thoughts of the Love that created all, so infinite in prophetic settings, so subtle with mysticism and charm. All this is common property for both the farmer and the poet, yet

how often unobserved and how seldom appreciated. To be convinced of this we need but drive through the country and observe the homes of those who live there. In many cases the natural beauties of the surroundings were not considered when the home site was chosen. If there is evidence of consideration at all, it is usually that of convenience only, just as if the wants of the body were all, and those of the soul nothing. Why not endear our homes by their settings? Why not have them removed somewhat from the gaze of the public, nestling among great trees and looking out over cheerful and lovely stretches of green fields, or if possible looking off to the distant hills? Why not bring a bit of the cool wood home and some of the swamp evergreens and arrange them there naturally as far as possible? Such homes are twice blessed. In their making they enrich the soul of those who bestow their thoughts on them, and later as appropriately artistic units they take their place in the whole scheme of natural beauty.

With this scheme man has little to do. All that is required of him is to be observant, appreciative and sympathetic. He will find that it is not only one of lines and colour, but also of moods. These moods continually influence the picture of nature. Generally speaking, they are associated with the seasons and more particularly with that thing we daily speak of—the weather.

In the country the seasons always send their harbingers. In the approach of spring we know it is upon us even when the thermometer still registers below zero. Spring is in the air. The cold evenings seem to be suffused with a strange quietness and tenseness, and the sky takes on tints of warmer glow. But this picture is not distinctive of the farm without its inhabitants—boy and all. The boy feels the call of spring though he be still skating on the pond in the hollow. As the days grow warmer he feels that "sap's runnin'," and he throws a handspring on the first dry sod. The cattle too are not mute in answering the call from the fields. The fowls regain their voices. The robin finds his way back from his indolent life in the south and proclaims his new found joy. The swollen torrents, the bursting buds, the vibrant charge that permeates all, makes the soul of man expand to conceptions of higher truths—a possible rich and new beginning from a worn out past.

Summer, on the other hand, gives us a feeling of permanancy. The long, warm days with their prevailing gentle winds, the high sun, the lull in life about us, make us feel as though nature had slowed down on a long course. The days in the fields become wearisome and the vagaries of nature trick us on all sides. The peaceful hills and meadows imbue us with their drowsy spirit. The fleecy clouds that play over them and send their shadows chasing each other over the fields like spirits just set free awaken our imaginations. From the distance the cool woods call us to their shade.

But this is not all of summer. It has its daily moods. Who has not seen the early morning break and day announced as with a trumpet?

"Day—
Faster and more fast,
O'er night's brim, day boils at last;
Boils, pure gold, o'er the cloud cup's brim
Where spurting and suppressed it lay,
For not a froth-flake touched the rim
Of yonder gap in the solid gray
Of the eastern cloud, an hour away;
But forth one wavelet, then another, curled,
Till the whole sunrise, not to be suppressed,
Rose, reddened, and its seething breast
Flickered in bounds, grew gold, then overflowed the world."

Beautiful as these scenes are they become more beautiful with a touch of life. The drowsy hills of summer seem even more peaceful with quietly grazing herds scattered over them and as the shadows lengthen these lines come to us:

"Where the quiet coloured end of evening smiles
Miles and miles
On the solitary pastures where the sheep
Half asleep
Tinkle homeward through the twilight."

I have only chosen a few illustrations from the natural history of the farm from among the many that constantly surround us. I have not touched on the sweet, sad days of autumn.

"When the maples flame with crimson
And the nights are still with frost,

Ere the summer's luring beauty
Is in autumn glory lost,
Through the marshes and the forests
An imperious summons flies
And from all the dreaming northland
The wild birds flock and rise."

Nor have I touched the winter, the most festive season of all the year but I have, I hope, made it clear that, if the natural history of the farm does not appeal to us, the fault lies absolutely with ourselves. Those of us who see the possibilities are not finding fault with those who do not. We are only sorry for them and hope that at least they wish they could. If not—as one writer rather grotesquely puts it—"instead of being on the soil they might better be under it, inspiring cabbages."

The farm is without doubt the basic industry of our country, and richer in its possibilities of national contentment than all other occupations. What is needed is an awakening and a development of an aesthetic appreciation. To accomplish this, the teacher must keep in mind the person taught, rather than the thing described. Scenes are only a means to an end and if a teacher is so overpowered by them as to colour his description extravagantly he shows signs of weakness. In short he must not rave. He must take as his guide the thought that an aesthetic experience is a pleasurable contemplation of an object, whether that object has a physical existence or is a mere imagery of the mind, called up by poetic description, or artistic reproduction. If beauty were only in the thing contemplated we might have great difficulty in deciding on standards, but this fortunately is not the case. Hence if a boy laughs while a foolish teacher raves the situation may be perfectly normal, but exceedingly ridiculous. Pure aesthetic contemplation may be well illustrated by the Psalmist as he gazes heavenward;

"When I consider the heavens, the work of Thy fingers, the moon and the stars which Thou hast ordained. What is man that Thou art mindful of him, and the son of man that Thou visitest him."

How to meet Some of Children's Nature Interests

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Just before the September 1921 *Cornell Rural School Leaflet* went to press the Editor of that publication and the author of this article received an interesting letter from a New York publishing company. The company was trying to urge the sale of a certain general science text book and in explaining the merits of the book stated that the material in the book had been chosen from questions which had been asked by children. An examination of the book showed an overwhelming abundance of material on physical science but practically none in the field of biological science. The title page of the book showed that its writer had been a trained physicist which may have in some unexplained way accounted for the type of questions asked by the children.

It was decided to make a similar examination of the questions asked by rural school children in New York State, and accordingly a questionnaire was inserted on the last page of the September *Leaflet*, asking that the teachers return the slip stating what Nature-Study questions they were being asked by their pupils. The *Leaflet* and questionnaire were sent to between fifteen and sixteen thousand rural teachers actually in service. Between five and six thousand teachers have returned the blank, but only one out of ten gave questions which were being asked by the pupisl. The statistics given in this article are drawn from the first five hundred questions submitted though more recently received questions show no indication of varying greatly in their nature from the first five hundred.

These questions were returned in such a way that there could have been no personal influence to determine the nature of questions asked. To be true, much of the material published in the *Leaflet* has been of a biological nature, but as will be shown later, a larger percent of the questions were asked concerning phases of the work which have not yet received thorough attention, than were asked concerning phases of biology which had been treated more definitely. This should in a way at least indicate that the

nature of the *Leaflet* did not determine definitely the nature of the questions asked.

Eighty-six per cent of the questions asked, dealt primarily with biology. Four and one-fifth percent dealt with practical agriculture; five and one-fifth percent with inorganic nature; three and two-fifths with pedagogy, and one and one-fifth were of such a miscellaneous nature that they could not be readily classified.

The questions of a biological nature were classified according to the branches recognized. Sixty-two and four-fifths per cent of the total number of questions asked, dealt with zoology. Twenty-one and four-fifths of the total dealt with botany, and one and two-fifths were of a strict ecological nature. Many of the questions classified under zoology and botany might however, with equal justice be considered under ecology.

The questions in zoology fell easily under the headings of invertebrates, birds, mammals, reptiles, amphibia and fish. The percent of the whole for each of these groups was as follows: invertebrates 25%, birds 15%, mammals 12$\frac{1}{5}$%, reptiles 5$\frac{2}{5}$%, amphibia 4$\frac{1}{5}$%, fish 1%. This is interesting because it shows how little the material recently published in the *Leaflet* influenced these questions. No number of the *Leaflet* has as yet been prepared dealing exclusively with invertebrates except for one number on aquatics. In spite of this, 25% of the total number of questions asked dealt with this group. This must be an interest to children, therefore worthy of recognition. (It might be mentioned here that a number of the *Leaflet* designed to appeal to that interest is in course of preparation, and as mentioned in the September 1921 REVIEW, this will be Volume 16, No. 7.)

The questions in botany totalled 21$\frac{4}{5}$% of the grand total. 6% of these questions dealt with herbs, 14% with woody plants, and 1$\frac{4}{5}$% with fungi. Apparently the children in the schools from which these questions came are less interested in botany than in zoology. The total number of questions asked in botany for example did not equal the total asked concerning insects, and was only about one-third of the number asked in all branches of zoology. Trees seemed to be more interesting than herbs, though the fact that these questions were returned in the fall when the leaves were dropping from the trees may have been an influence

here. In this connection, it might be mentioned that apparently the season at which the questions were written had considerable to do with the nature of the questions. While the leaves were falling, the most frequently asked questions were "Why do trees shed their leaves?" and "What makes leaves change color?" Later on these questions were not asked, but in their stead came questions on meteorology such as "Why does the frost stay longer on bridges than on the ground?"

Inorganic nature claimed 5⅕% of the total number of questions asked. 2⅖% dealt with geology and paleontology, 2% with meteorology, and ⅜ of 1% with astronomy.

Applied science in the form of agriculture laid claim to 4⅕% of the grand totals, the questions being divided more or less equally between gardening, dairy, farm crops and poultry. The cow's cud seemed to be the basis for more questions in this group than any other thing.

Three and two-fifths percent of the total dealt with teaching problems which were obviously asked by the teacher rather than by the pupils. The remaining 1⅖% were of a highly miscellaneous nature.

There are certain weaknesses in a statistical method such as has been followed here. The chances are quite probable that many of the teachers wrote down only those questions which they themselves could not answer, or which they considered unusual. If this was generally the case, it is obvious that the teachers need further help in the field of zoology—particularly in entomology. Help of this sort is forthcoming in a leaflet soon to appear. There is also some danger in drawing conclusions when the numbers of questions asked are not greater. The number represented ought to give some clue as to what might be expected however.

A further examination of the questions returned gives some interesting light on the phases of the subjects considered which seemed to be most commonly present. If we may judge some of the books we read we might expect that definitions, morphologies and bits of taxonomy would be most important. Thirty-nine and ⅘% of all the questions asked however dealt with habits and activities. Nineteen % were questions in taxonomy; 16⅗%, in economy; 8%, teaching problems; 6⅘% physiology; 5⅕% miscellaneous; 3⅕%, ecology, 1⅕% definition; 1⅕% mor-

phology and $\frac{3}{5}$ of 1% with legal questions. Some significance ought to attach itself to the abundance of questions dealing with habits. More questions of this than of any other sorts were asked concerning invertebrates, birds, mammals, reptiles, amphibia and fish. More questions concerning taxonomy were asked concerning herbs and fungi, than of any sort and the greatest number of questions asked concerning trees dealt with plant physiology. A very large number of the questions asked and grouped under habits and physiology might with equal justice be considered as being under the heading of ecology.

A most important observation in connection with the whole list of questions is, that not one of the five hundred dealt with exotic plants or animals which had no every day association with the lives of the children. The only question dealing with phases of life not common in the immediate environment was one concerning silk worms, and even here it dealt not with the life habits of the silk worm but rather with how the commercial product was secured from the natural source.

The most commonly asked question was "What is the difference between moths and butterflies?" Other very commonly asked questions were, "Are all snakes poisonous?" "Why do some animals hibernate while others do not?" "How can a frog buried in mud breathe?" "How does kerosene kill mosquitoes?" "What are the round swellings on the ends of willow branches?" "How do insects live in the winter?" and questions of a similar nature. Of course there were many absurd questions which were asked such as "What agitates the horse's hair in water?" "Do dragon flies sew up your ears?" and questions of this sort. The absurd questions were however surprisingly few and everything pointed to the conclusions that the questions given were such as might have arisen from inability to interpret observations which had been more or less deliberately made.

It was hoped that this article might summarize a brief survey of work which was done in Chicago, New York City, and Syracuse, New York, in attempt to determine what nature topics were most commonly presented artificially to children through toys and books. The results of the observations made last year in stores in these three cities indicated that it was evidently assumed by the manufacturers of the toys that the most desirable nature topics dealt

with bizarre and uncommon phenomena and forms of life. The figures made showed that the most commonly exhibited toy animals in the three cities were as follows in the order of their abundance;—dog, horse, monkey, elephant, cow, cat, goat, sheep, bear, rabbit, pig, lion, camel, squirrel.

Few birds were found represented outside of picture books. Reptiles were very rarely found represented and amphibia and fish were as a rule apparently composite creatures of many or no species.

From the evidence collected it seemed quite evident that less attempt was made to interest children in the commonplace species than was made to interest them in exotics. Further data on this subject would be highly desirable in determining whether or not there is any relation between the species used to add to the nature knowledge of children artificially and the species which the questions received indicated, held a natural interest for children. Though twenty-five percent of all the questions asked dealt with invertebrates, particularly insects, members of this group were but sparingly represented in the artificial nature with which many children first become acquainted. Native mice, shrews, bats, skunks, muskrats and weasels were found represented only in books and there sparingly. These are the creatures however with which children are to be thrown are they ever to make a living directly from the land. A possible explanation for the abundance of foreign animals found may be found in the fact that formerly, at least most toys were manufactured abroad. Why shouldn't children however be given the opportunity of finding out about their immediate environment? Why shouldn't our illustrated alphabets that state that a is for alligator, t is for tiger, and z is for zebra instead tell of nature things. We are advised to see America first, but we teach our children through Noah's arks to know about the creatures of another hemisphere first. We advise teachers to lead their children from the known to the unknown, but place in their hands books which tell about creatures which the children well never have the opportunity to study first hand. If we must have these illustrated alphabets, toy animals and the like, why not make them appropriate to the needs of the children using them. Jingles if necessary at all may be used to teach truths as well as nonsense. While the author

does not pretend to be a poet, he feels that he has no right to offer adverse criticism without offering a substitute for that which he decries. Accordingly with fear and trembling the following is submitted:—

An American Nature-Study Alphabet

A is for aphid, a fat little louse
that sucks up plant juices and lives in a house.

B is for bats that fly in the night
and eat up mosquitoes with all of their might.

C is for cabbage worm, green, hairy and slow.
He'll become a white butterfly some day I know.

D is for dragon fly, the elf of the pond.
Of mosquitoes and gnats he's indeed very fond.

E's for the eel who very squirmy may be
Though he lives in our brooks, he was hatched in the sea.

F is for the frog, a funny old thing
He eats flies and mosquitoes and sings in the spring.

G is for goldfinches who seem care-free all day.
"Per-chic-o-ree, chick-o-ree" that's what they say.

H is for hair snakes, though found in a stream
They live in some insects before they are seen.

I is for iris a stately blue flower.
It lives in wet places and welcomes a shower.

J is for jay-bird, a noisy young scamp
He's about as much good as a common old tramp.

K is for kingbird, a plucky young fighter.
He beats crows and hawks, though he's very much lighter.

L is for lightnings that flash in the sky
While the "Boom, booms" of thunder say that summer is nigh.

M is for muskrats with very fine fur.
Their paths under water will show where they were.

N is for nuthatch who stands on his head.
He works on the tree trunks but likes to be fed.

O is for the owl, a mouse-eating bird.
He seldom is seen but is quite often heard.

P is for potato beetle, striped down the back,
A grosbeak will grab him and give him a whack.

Q is for quail, the farmer's best friend
Who has not a bad deed which he has to amend.

R is for rabbits that nibble the trees
And run 'round at night just as much as they please.

S is for the skunk who's all black and white,
Though he smells very bad, he's really all right.

T is for turtle that lays lots of white eggs
And draws in his head and then draws in his legs.

U is for underwing which feeds on our trees
And hides from its foes with the greatest of ease.

V is for veery that sings in the wood.
If you never have heard him you certainly should.

W's for woodchuck or ground hog. I don't care
He eats up our grasses and lives in a lair.

X is the sign men use for the unknown,
Are you going to help out? Well that will be shown.

Y is for you who hearing this verse
Should help save our friends 'fore the world gets much worse.

Z is for zephyrs that blow o'er the land,
If you've done lots of good things, they make you feel grand.

News Notes

Dr. R. W. Shufeldt is lecturing to large classes of both teachers and pupils of the Washington, D. C. schools.

The Nature Lore School for Camp Councilors is to be held at Professor Vinal's camp at Wellfleet, Cape Cod, June 22—29. The staff includes Thornton W. Burgess, E. H. Forbush, Anna Botsford Comstock, Marie Stillman Russell and Mary Stillman, Delia I. Griffin, Manley Bacon Townsend, Dr. Henry P. Lovewell and Professor Vinal.

Harold L. Madison, Curator of Education at the Cleveland Museum of Natural History has just issued a pocket size pamphlet on "Trees of Ohio, Identified by their Leaves "which is excellent from every point of view.

Mr. C. W. Goethe of Sacramento, California continues to publish and send out his valuable and interesting leaflets on different phases of nature lore. His unselfish devotion to the cause of nature-study is an inspiration to us all; and his achievements in introducing nature guides in camps as well as in interesting the children of this great State in life out of doors is most gratifying to witness.

Dr. E. Laurence Palmer is to teach in the summer school at the University of California this year.

Ths Nature-Study Staff for the Summer Session at Cornell this year will consist of Anna B. Comstock, Ethel Hausman, Dr. J. D. Detwiler, Charles Beaman and Leah Gause.

Laughing Waters
Rock Lake

*Algonquin Days

FRANK MORRIS

Peterborough, Ontario

To have tramped the English Lake District with its bare heaths and hills and open roads is no small pleasure in a man's life, but nothing to the thrill of entering for the first time a region of unbroken forest such as lies north of us in the Province of Ontario; and what if you found the two together, a network of a thousand lakes lying in the heart of the forest? That is Algonquin Park; take flight on the wings of fancy to such a place, and settle on a certain wooded island of one of its lakes; you will be with me in spirit and the better able to share what I wish to communicate, the impression of five or six weeks at a stretch, spent under canvas there, every summer for nearly a decade.

Almost the first thing we noticed about camping in Algonquin was how quickly our tent and its inmates, catching tone and colour of the woods, seemed to melt into the wild life about them.

*Read before the Entomological Society of America in session with the Entomological Society of Ontario at the Toronto meeting of the A. A. A. S.

This is a feeling that can never come to the hotel guest, even in the midst of ideal surroundings.

"To her fair works did Nature link
The human soul that through us ran;"

we were a part of all we saw, and it thrilled us with delight, the dawning knowledge that even the wild creatures themselves had admitted us into the goodly fellowship of wood folk.

The loons that had their home on the narrow reach of water beyond our bay would come floating in to feed within a boat's length of the shore; the big mink that lived among the driftwood took up his daily fishing post on the butt of the floating pine log. Even a pair of beaver, time and again at sundown, swam over from the little cove on the opposite shore to enjoy their evening repast among our lily pads. The very deer resumed their wonted paths, moving right by our tent; often in the night or at dawn we would hear their footfall as they passed down to drink their fill at the bay: occasionally one would snuff uneasily as it caught the tainted air. Even in broad daylight they would come browsing to the edge of the clearing, and once, on emerging from our tent, we saw a few paces away, just back of an old moss grown log two does and a fawn quietly cropping the leaves from a little clump of hazel.

It was a great delight to stand perfectly still and watch the deer; they would often look full at you in a prolonged stare and then turn to feed again, from time to time raising the head or turning it somewhat sharply to see that you weren't trying to take advantage of them. You might even speak to a companion, and if you used level tones and didn't raise the voice excitedly, they showed no alarm. It would almost seem as if the sense impressions of eye and ear allowed the creatures to think for themselves in independent judgment; but once they scent you, reason goes overboard, and they stamp and blow in blind panic; like Falstaff, they become cowards on instinct. Their sense of smell is an age-long heritage that has both preserved the race and made it what it is; years, even generations, of protection in a forest sanctuary will not appreciably modify this guiding principle of the animal's life.

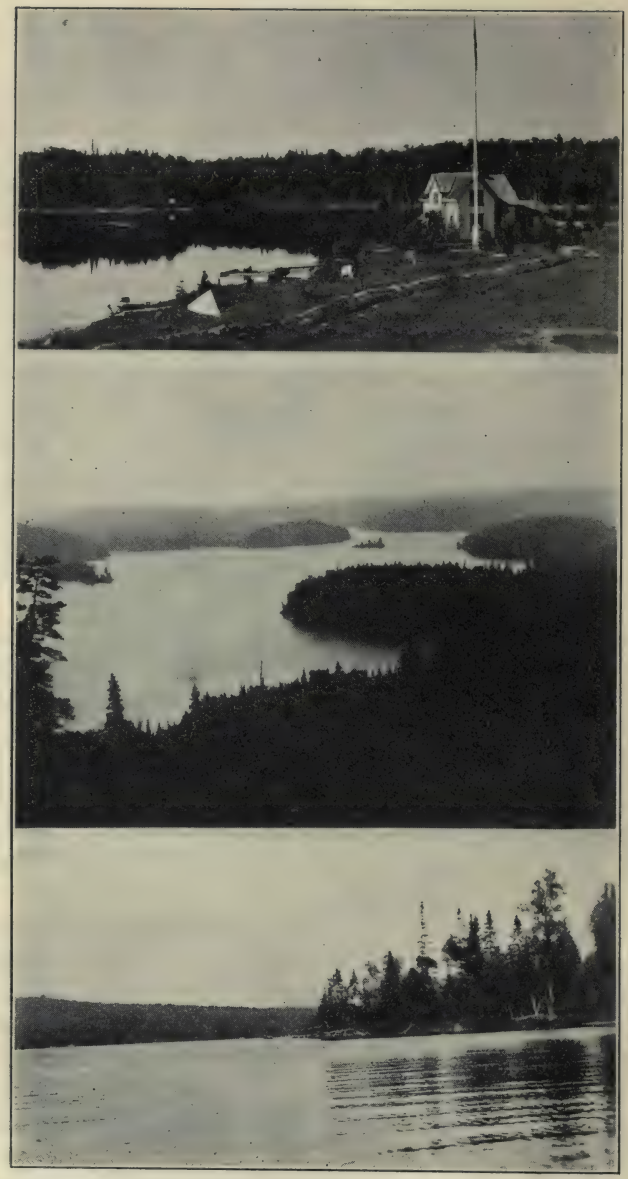
Our second season revealed a fresh charm; it taught us the delight of greeting old friends, in flower and insect, bird and

beast, about the camp, the island, and the lake. Paddle with what speed we might to open camp, our eager spirits would be round the corner ahead of us; and, once on the island, we could hardly wait to stretch the canvas and unpack, before making some favorite round, perhaps of ferns and flowers, perhaps down the western bay to watch the waxwings hawk after insects, or up the Madawaska to hear the Olive-sided Flycatchers and see the deer come down at dusk from the woods.

We were soon so used to sleeping under canvas that instead of sitting up tensely listening to every little rustling sound, we lay secure; it became even a luxury of the night to keep awake for the call of the owls under the August moon; sometimes, the sonorous note of the Horned Owl; oftener, the twice repeated four-fold cry of the Barred Owl. Hardly ever did it fail of an answering call from afar; gradually the birds would draw closer and closer together; when, as often, they met in the forest canopy over our heads, it was wonderful to hear the deep gurgling tones of soft endearment, like the crooning of doves or brooding rooks, but fuller, more guttural and far more melodious.

In our second season we built a cedar float for a wharf. This raft-like object in the little bay somewhat alarmed our guests, the beaver—but not for long, and it was accepted by the bolder spirits the very day after its completion. I happened that morning to be out trolling for bass soon after daylight, and presently saw a muskrat reconnoitering about the float. In a little while it dived, and uprooting some aquatic herbage, proceeded to drag a load of it under the wharf, having evidently decided to begin building on this highly desirable site.

It worked away vigorously for nearly a quarter of an hour, when it was spied by the big mink at the pine log. Your rodent is no match for a weasel, and it was soon forced to beat a retreat, while the mink returned to his log cabin. In about ten minutes, the muskrat swam cautiously back, found the coast apparently clear, and at once resumed operations. Again the mink returned to the charge, and this time dived under the float and fairly routed the intruder out from its position among the cedar stringers. He then mounted the float, and, standing erect, watched the rat round the bend to see that it really did double the point instead of trying to sneak back under water.



Cache Lake Headquarters

Cache Lake From Skymount on a misty morning

Sun and Shadow Cranberry Lake

It was delightful indeed to note this fearlessness among the wild animals. Jerry Muskrat was obviously far more afraid of Billy Mink than he was of me. This was mainly the golden harvest of sanctuary, for in settled parts the muskrat is cautious, if not timid. Last August as we paddled down through the rapids below White's Lake in a very narrow reach of the Madawaska, we almost ran into a muskrat. At first we thought it had been taken by surprise and was trying to escape us by diving; but we soon found it was feeding quite unconcernedly. We stopped paddling to watch the little creature foraging right beside our canoe; the water was so shallow that when the rat reached its favorite patch of cauliflower, the little leaf-rosettes of pipewort growing in the bed of the stream, its tail was still "wiggling" above the surface with all the animation of an undocked terrier pup's, and so close to us that once in a while it would flip against the side of our canoe. Presently under stress of breeze or current we drifted over it just as it rose to the surface; it dived this time and took shelter under a log; one of the strangest of sights! to watch an air-breathing animal submerge and glide, smooth as a fish, into its aquatic lair. Again it came to the surface, just below us, in deeper water where the channel widened out; and this time when we paddled up, it showed us a clean pair of heels and disappeared with a farewell smack of its tail.

The mink, of course, is proverbially bold. One day as we were paddling back to camp with our mail, we noticed a mink standing on a little rock, marooned (as it were) in mid channel behind our island. Taking a quiet stroke in its direction, we allowed the canoe to drift up to the rock, expecting the mink to beat a hasty retreat and escape by diving. To our surprise, even consternation, the mink deliberately rose up, snuffed the breeze with enquiring nostril, and then, crawling down the stone, plunged into the water and swam straight for us; on reaching the canoe, it actually tried to clamber up the smooth side and get over the gunwale. This didn't seem to us to be playing the game according to Hoyle, and it was some time before the true solution occurred to me. I had been fishing the day before, and the smell of bass was evidently still perceptible to this sharp-nosed fisherman of our native waters.

In fact, though it serves a different end in the two creatures, the sense of smell is no less imperious in the mink than in the deer, and leads to just as unreasonable action. Not long ago a camper on a tiny island was cleaning fish with a jack knife, when up popped a mink at his elbow; he threw it a grey trout's head and it made off with its booty; in a few minutes, like Oliver Twist, it was back for more; and when he quite properly refused to pander to the glutton, it actually caught hold of the fish he had in his hand, and he was forced to tap this slim gentleman of the road two or three times quite smartly over the nose with the flat of the knife blade before he could persuade it to leave go.

In our third season of camping we began to keep a sort of Visitors' Book of the most striking personages that called at our camp. Almost the first entry was a flock of American Mergansers; these birds are often to be seen about Cache Lake, usually hugging the shore and coasting along by point and bay; they seldom take to the wing, but escape by a sort of "scuttering" flight along the surface, wings and feet in full play like the hoppers of a water wheel. They often band together, two or three broods of them, into a flock of 30 or 40. One day as we were sitting at our camp table, a few yards in from shore and partly screened by a fringe of balsams a regular "raft" of over 30 of these birds, frightened by a passing canoe, came splashing across our bay and settled down behind the big floating log. Back of this barrier they formed into a long line of clucking protest. When the coast was clear, they clambered (still in line) onto the log, heads all turned outwards in the direction of the moving canoe; they looked for all the world like an awkward squad of raw recruits dressing by the left; the log was partly under water and very slippery, so that every now and then one would fall backwards or forwards out of line to flounder in the water. Evidently there was no danger from the landward quarter; they never so much as glanced in our direction.

Three seasons ago a baby beaver, apparently deserted, was brought into our camp, and for a fortnight we tried to rear it. It had obviously never been weaned, and several days went by before we could get it to eat at all. Unfortunately it had been badly injured and did not long survive. But it was an affectionate pet with quaint little ways of its own, and the daintiest slip of a paddle tail that it trailed along behind it. It was scrupu-

lously clean and after dining would always wash its face and smooth its fur with tongue and paws. It was curious to see the beaver traits coming out in it; it would crawl about the floor of the boathouse and when it came to anything resembling a stump (my foot, for instance) it would raise itself up onto its hind legs and balancing with paddle tail below and forepaws above, stand there resting like a pigmy kangaroo.

Last season we had almost daily visits from a hen partridge and four of her chicks. We first heard these visitors soon after dawn, when our newly awakened senses became aware of a gentle clucking outside the tent. They usually paid a morning visit, occasionally early afternoon, wandering slowly across our lot, foraging among the brackens and brush; the mother would always mount on a perch—a stump or a log—and begin clucking softly, a kind of crooning lullaby of "all's well" to her chicks; keeping within hail of this call from the outlook in the crow's nest, the chicks would feed about at the boathouse steps or under the dining table with all the assurance of barnyard fowls; once as I was shaving at my boudoir stand of a clump of silver birch trees, the mother mounted a log just behind me and purred away in so soft and soothing a key that sometimes, like Homer, she nodded drowsily in her song and almost fell from the perch, while her chicks fed in and out between my feet.

Twice in the middle of last August we had a visit from a pair of Pileated Woodpeckers (the black Cock o' the Woods). On their second visit the birds discovered an old pine stump just west of our clearing and spent the better part of an hour digging into the heart of it. They allowed one of us—camouflaged in khaki—to get within a few feet of them and sit on a log watching their operations. They uttered cries like those of a Flicker, and it was worth a great deal to watch them at work. The smaller of the two birds seemed the more aggressive and drove the other away from its special preserves in the punky heart of the stump. They threw their heads well back, making full use of the long somewhat scrawny neck in hammering. Often they would tear great flakes of rotten wood out with the bill and fling them backwards over the head. When they knocked off work we came forward to inspect the scene of excavation. Almost a bucketful of rotten wood lay on the ground, and on three sides the stump

was hacked to the heart; at one point near the centre of the stump, a section of wood, more strongly impregnated with resin, had resisted their efforts and stood up, a great jagged tooth, in the midst of the ruins, but chiselled so thin as to be partly translucent and in three or four places actually perforated. For quite a long spell we had watched the pair, one on each side of this partition wall, tapping and drilling like miners entombed. Seen at close quarters, with their great size, the crimson crest produced behind the head, the long wiry neck and ponderous bill, above all with their amazing proficiency, they presented an impressive spectacle indeed, these master-craftsmen in the ancient order of foresters.

No sooner had we realized we were going to make good as campers than we bought a canoe and mastered the arts of paddle and portage. It took a season and more of good hard work, but even ten years' hard labour would have been getting off cheap for all the swag we pocketed cracking that crib. Paddle and portage are the master key to the Park. Last August, for instance, we made a week's trip to the middle of the Park and then down the Oxtongue river to the High Falls near the Lake of Bays; every hour of every day chock full as a plum pudding of the fruits and spice of discovery, and overlarded and basted with sweet sauce of the same till the Nature lover in us had fed too fat almost to waddle; for me the peak of romance was reached on this trip when we discovered, floating on the main channel of Joe Creek, masses of a beautiful flower of delicate violet, a flower that thirty years ago was known only on the Atlantic Coast, but since then reported from ponds in North Indiana and Michigan—the Purple Bladderwort.

This I call the Freedom of the Park, and it came to me as soon as ever I learned to portage. My first trip under a canoe was across the trail from Cache Lake to Hilliard, and it was by way of resting neck, back and shoulders from the strain of the load, that I clambered along the ledges of cliff just south of the path, where presently I found myself staring at plants upon plants of a fern I had never seen before, the Crag Woodsia (*Woodsia scopulina*) recorded up to that time only from stations in the Rocky Mountains; and here was I in the heart of Ontario and within ten feet of level ground.

My second venture was up White's and across to Little Island Lake. Here on the far shore of a beaver pond midway on our route, I found in the black ooze, between margin and water, patches of a strange little magenta flower about two to three inches high. It proved to be the tiny Reversed Bladderwort (*Utricularia*

A Forest Trail
On the Road to Cranberry

"Magic Casements"
Cranberry Lake

"Neither axe nor saw"
A Beaver Felling

resupinata). Two seasons later, in the same spot I discovered the pigmy Humped Bladderwort (*Utricularia Gibba*), the long-leaved Sundew, the Yellow-eyed Grass and the Bog Club Moss.

But after all, the Park in my judgment is a Paradise for the Naturalist as free-lance amateur rather than specialist. No doubt everyone with a hobby would make some discovery of his own in Algonquin, but when you reflect how late in the summer one's camping begins, how short the season and how northerly the latitude, you are forced by sheer logic to accept this conclusion.

Often, I admit, the specialist rose rampant and insisted on having his fling. Again and again, for instance, I buried the entomologist in me, and just when I thought I had laid his ghost, some rare beetle would visit the camp, *Leptura bifon's* at the boathouse window. *Pogonochaerus penicellatus* on the rustic bench, or (deadliest lure of all) an unknown Longhorn in flight across the clearing. I reckon I must have buried that entomologist alive; indeed I strongly suspect him of having shammed dead and assisted at his own obsequies; like an actor on the stage when there's a hitch in the drop of the curtain, he was just a shade too quick in his resurrection. It didn't matter what I was doing, reading in the hammock, writing in the boathouse, or splitting wood by the tent, there would be a lightning change, and the entomologist would be seen in the full glare occupying the centre of the stage, with cyanide bottle or insect net, even bare-handed, but prompt at the cue and always ready to play his part.

Once, for instance, in a backward season, I found a number of flowering plants still at the height of their bloom, and reaped a rich harvest of anthophilous insects; especially on an open stretch of stream by Hilliard Lake, where clumps of spiraea lined the banks. Here I captured some 12 species of Longhorn, including *Leptura plebeia*, a prize in itself.—I came by this collector's paradise last August; and the scene was changed. The whole space was a riot of Spotted Touch-me-not dangling its golden jewels in rich profusion; in place of Longhorns were a score or more of Ruby throats hovering at the blossoms or darting about in the air, often fiercely driving intruders away from their chosen booths in this gay bazaar.

Sometimes it was the botanist in me that rose to the surface with a gasp as from a long submergence. But something, some-

how, in the spirit of the place, seemed always to offer silent rebuke to the specialist; the scales would fall from his eyes, and he would stand and worship nature with the simple faith of a child.

To clinch the point—in 1920 I came up to the Park hot-foot from a series of plant trips in New York State and Central Ontario. I had orchids on the brain, and nothing would serve but I must work out a problem in the Rattlesnake Plantains (*Goodyera*), of which two species at least were known in the Park. Material lay all about me and not infrequently seemed to give the lie to the voice of authority in the book. I had marked down a fine spike of Menzies' Rattlesnake just over the ridge of the island; it was distinctly not according to book, if the blossoms fulfilled the promise of their buds. "It's a mean thing to contradict an author," I reflected; "but it's just as mean a thing to tell fibs in print, and what if Nature does the contradicting for you?" To make assurance doubly sure, I stepped along a little deer trail through the hazels to examine the plant again.

It was growing between two windfalls of balsam that formed one side of a sort of natural stockade here six or seven trees caught in a sudden flaw had so fallen as to fence in a small square of ground. In this enclosure I noticed the mottled rosettes of some more of my orchid, and stepped over a tree-trunk to get them. While moving softly about in the space, eyes on the ground and thoughts engrossed with my problem, I suddenly had that strange sense of being no longer alone, which must surely be one of the race's most ancient instincts. I raised my eyes towards the further barrier of fallen trees, and there at the foot of a tiny balsam, partly screened by the leafy branch of a honeysuckle, lay a little fawn fast asleep in a bed of leaves. For some moments I stood frozen, a few paces off, and watched it; presently its eyes opened and it looked straight at me in a calm and steady stare, no trace of either fear or surprise; then it lowered its head, closed its eyes, and snuggled down to sleep again.

Backing cautiously away, I stepped out of the charmed circle, and after a single glance back at the miracle within the magic ring, hurried down to the tent and brought my wife to share the vision. At first so well screened and inconspicuous lay the fawn that I thought it had gone, but presently the dappled back and side revealed themselves among the leaves. We both watched

it for some minutes, and twice it opened its eyes drowsily and looked at us, but evidently convinced we had called it too soon, it returned to the land of nod.

Half an hour later I was at Headquarters telling Mr. Bartlett of our latest adventure. Hearing we had left the creature undisturbed, the superintendent caught up his camera, and we paddled full speed to the foot of a steep cliff not far from the sleeping fawn. There it was, just as we had left it. Mr. Bartlett took several snaps of it, and finally, at his suggestion, I stepped round to the back of the fallen tree under which the fawn lay, and thrusting my arm cautiously through the brushwood lowered it till I could touch the creature with outstretched hand. I stroked it, twice, very gently, with the tips of my fingers; but this was too much for even cervine endurance; it twitched its skin violently, as a calf might to dislodge a fly, and then starting up, bounded off a few paces on its long legs. Even then, reluctant (as it were) to go, it faced about for a last look at us before passing leisurely out of sight through the woods.

It never returned to this lair, but chose a new one; and a week later, when I nearly stepped on it lying beneath the broken end of a dead birch in the heart of the woods, it had already learned its first lesson of fear.

Three Poems by Virginia Baker

Blue-eyed Grass

Pretty maids in frocks of green
  Hiding in the meadow grass,
Peeping out with starry eyes,
  Blue as summer's bluest skies,
At me as I softly pass;
Tell me, little ones, oh why
You're so very, very shy
  That you shrink from being seen.

Tell me what it is you fear
  In this quiet, sheltered spot?
Who would any evil do
  To such fairy mites as you?

Courage, darlings, upward look;
Wipe the dewdrop tears away
From your azure eyes, I pray,
For no enemy is near.

A Mystery

Whence came, on the horse-chestnut's bark,
Those curious hoof-prints, wee?
Did some sweet maid of Fairyland
In bygone days once flee
From a pursuing ugly dwarf
For refuge to the tree?

And did some gallant elfin knight,
Mounted on fleet winged steed,
Half fly, half gallop up the trunk
To aid her in her need?
And do these prints remain to-day
Memorials of his deed?

And was the dwarf in combat slain?
And did the maiden plight,
In gratitude, her heart and hand
Unto the brave young knight?
And were the couple, afterward,
Forever happy, quite?

Indian Fairies

I'm sure that Indian fairies lived
In days of long ago,
And danced their Indian dances, queer,
By fireflies' fitful glow;
With blooms of moccasin flowers, I think,
Their dainty feet were shod,
And in their raven hair were plumes
Of yellow golden-rod.

I know they battled and hunted, too,
With leaves of arrowhead;
And, since they had no bark canoes,

Used lily pads instead.
And I believe, in times of peace,
From wildwood depths they'd get
The wax-like sprays of Indian pipe
And smoke the calumet.

The Architecture of the Coco Palm

(COCOS NUCIFERA)

ELMER EUGENE BARKER

We were sitting on the tile-paved piazza of my Porto Rican home, my friend and I, sipping our after-dinner coffee and gazing at the distant mountains. Here and there a royal palm graced the landscape, stately and dignified but as stereotyped as a figure printed on chintz. Close at hand a coco palm raised aloft its tuft of plumes, now silhouetted against a glowing sunset sky.

I remarked to my friend that my admiration and love for this beautiful tree was constantly deepening. It was he who called my attention then to features of its construction that have lead me further to study it. Thus, to what was at first merely an admiration of its aesthetic qualities, has now been added an appreciation of its structural attributes. Altogether my appreciation and admiration have increased with knowledge and familiarity until I wonder if the Creator could have made a more perfect thing. Surely, a scientific knowledge of detail and structure of a natural object need not rob it of romance and charm, but should, rather, enhance the marvel of its being.

To me it is a thing of glorious beauty, whether tossing and waving in the breezes or brooding motionless in the breathless moments of a tropic calm,—whether gilded by the rising sun or silhouetted against a sunset sky,—glistening in the fullness of the noonday's sun or gleaming in the moonlight,—or even rustling and dripping in a downpour of rain,—at all times equally beautiful and always manifesting a variety of mood and expression.

Of its varied usefulness we shall, perhaps, speak in another article,—how it furnishes food and wherewithal to millions of people who live in the tropical belt of Earth. Here let us examine

its structure and marvel that every part of it is so well adapted for its purpose and that the ensemble has resulted in a thing of surpassing grace and beauty.

Logically, the place to begin might well be the roots, for altho its towering crest is the conspicuous part that first takes the eye, the unseen roots are the mechanical support and nourishing organs for the whole structure. The roots of a mature coco palm may spread to a radius of twenty feet or more about the base of the trunk. The palms need abundant space, then, for root growth as well as for their leaves to develop without interference. The roots do not penetrate deeply into the soil. Indeed, this plant is a surface feeder, never sending its roots more than a few feet down. They are cordlike, usually about the size of one's finger in diameter, devoid of root-hairs, and are produced in close-set profusion. They are preeminently absorbing organs. While they afford the necessary mechanical support for the towering stem and its crest of leaves far aloft, this function might, probably, be achieved by any other type of roots. In this instance, however, what is needed is only a set of absorbing organs that can take up the nutriment dissolved in the soil waters quickly and in great quantity. The coco palm loves a light soil well watered from beneath. That is, there must be an abundant supply of fresh water constantly furnished in the deeper layers of soil, whence it can rise by capillarity to the roots above. This water table must not be near the surface for the palm will not tolerate a soil that lacks drainage and which is not well aerated. Its ideal conditions are found along the sandy shores that border the oceans in all the tropics.

The stem or trunk is merely a great bundle of tough, elastic fibers loosely enough packed together so that they can yield to the driving winds of a tempest without snapping off. Here again, mechanical support of the peculiar type needed is combined in the same organs with the water-conducting power. Like the trunks of other monocotyledons, its trunk never can increase materially in diameter as the tree grows taller and older. The diameter of a palm a century old and towering 80 to 100 feet is no larger than when it first raised its fronds above the earth. Hence, the need that this slender stem should afford the most perfect service of water transportation and strength and elasticity. This it does

eminently well. A bulbous swelling at the base doubtless serves structurally as a sort of buttressing support. The persistant crescent shaped scars where the fronds have separated from the trunk make a pleasing pattern on the gray bark.

Now, the crest of leaves is truly the crown of this kingly plant. I cannot trust myself to expatiate upon its beauty as my enthusiasm might lead me to use language that would sound extravagant and over-sentimental! So I will restrict myself to a description of its mechanical structure and the perfect adaptation of structure to function.

In the first place, let us consider the individual leaf, frond or "penca" as it is called by the Spanish-speaking people. One notices first that it is pinnate, that is, long strips of leaf are borne along two sides of a strong midrib or stem. This type affords a maximum amount of surface to the sunlight with a minimum resistance to the wind. Each leaf, often 15 to 20 feet long and four to six feet broad, would afford a big resistance to the winds if it were entire. Obviously, if such were the case, either the leaf must split into shreds, like the banana, or the entire leaf be torn away, or perhaps the tree itself be broken off. Certainly, the slender stem of the coco palm could never carry such an expanse of sail if its resistance to the wind were not reduced by every possible device.

Now, in addition to the leaf surface being cut into strips thru which the wind may pass harmlessly, we find that these strips are attached to the midrib as a V-shaped fold (figure 1). This makes for strength and at the same time flexibility. It permits any amount of lateral movement but provides for a measure of vertical stability. Thus the strips may wave and sway in the breezes or fold close in a storm and offer almost no resistance to the air current.

The midrib itself might well excite the admiration of a structural engineer. Broad and clasping at the base, it half encircles the trunk, grasping the latter by the crescent shaped horns of its expanded base (figure 2). Its attachment to the trunk aside from this is really slight. The vascular bundles continue from the trunk into the leaf but when the leaf is old and these give way there is nothing more to hold them in place and they come loose and drop off without any wrench or tear and leave no wound to

heal. At the base of this leaf-stem we find a great thickening on the under side. It is an excellent buttress to support the out-arching frond against the trunk. This swelling diminishes gradually away from the trunk, and at half to two-thirds of the

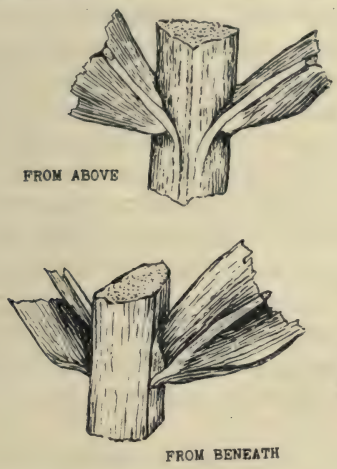


FIG.1 ABOUT 1/3 WAY BACK FROM TIP OF PENCA

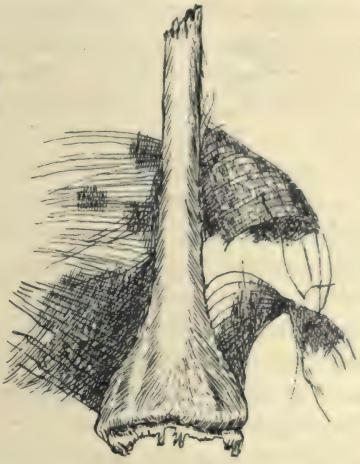
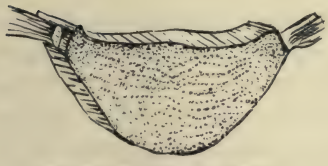


FIG.2 BASE OF AN OLD PENCA THAT HAS PARTED FROM THE TRUNK WITH WEB STILL ADHERING



AT THE FIRST PAIR OF PINNAE

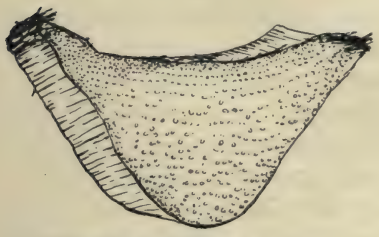


FIG.3 BELOW PINNAE - TOWARD BASE OF PENCA

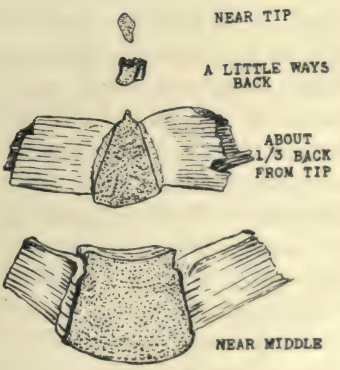


FIG.4 CROSS SECTIONS OF MIDRIB OF "PENCA" OR LEAF OF COCO PALM. UPPER SURFACE ABOVE

way to the tip of the leaf it disappears altogether. Of course it is not needed here. Indeed, it would be detrimental, for away from the trunk flexibility is needed. In accord, then, with this mechanical necessity, we find the shape of the organ changing in cross-section. First, the buttress beneath disappears, then it becomes rather triangular in shape, but with a strengthening ridge running for a ways farther along the dorsal side. This gives vertical rigidity but allows complete lateral freedom of movement. About one-third of the way back from the tip of the frond, in most individuals, this dorsal ridge disappears and the tip is left free to bend and swing in every direction. Hence the graceful curve seen at the tip of the leaf, and hence the individual difference noticable between one palm and another as regards the curving or erect attitude of the fronds. One can see in the accompanying sketches (figures 3 and 4) of cross-sections of a midrib how the structure is gradually suited to every changing need of each inch of length, and also how the bundles of conducting and strengthening fibers run thru the interior.

The clasping bases of the leaves have been mentioned as an item in securing support for the leaf without compromising the safety of the tree as a whole by too strong cohesion. Additional support is afforded to the fronds by a very strong fibrous sheath which envelopes them and binds them together and to the trunk. It is an outgrowth of the vascular bundles from the margins of the midribs and consists of two sets of interwoven fibers crossing each other at almost right angles. So artificial does this webbing appear that it is difficult to believe that it was not woven with warp and woof on a crude loom. Outgrowing from the two margins of the basal part of the midrib it forms a sheath completely enclosing the younger fronds. Thus, several of these, one outside another, together form quite a strong, vaselike structure thru which the upshooting fronds protrude (See cover). As the weight of the overarching fronds increases with size and expansion, these fibers gradually give way from the top downward, thus freeing the frond and allowing it to droop more and more. By the time it is mature and ripe, as the time of its usefulness to the tree draws to a close, the frond is allowed to hang low and out of the way of the younger and out-standing fronds. Thus it is retained as long as it has any usefulness whatever, but it is out of the way.

In a mature palm, whose crown is clear of the ground, the shape of the head is, then, spherical. It presents surface to the light in all directions, and the breezes play thru it with a soft sound like the rustling of rain, but come a stronger wind, and the leaves curl upon themselves and fold together and turn away from the wind, and practically, only knifelike surfaces are exposed to the incidence of the onrushing current. Thus the slender stem is able to bear the great crown securely and the grace of the marvelous miracle is preserved.

A tree is known by its fruits, is the old adage, and the coco palm is no exception to this saying. Indeed, the coconut is the only part known in many regions of the world remote from where it grows. The nuts, stripped of their enveloping husks, are shipped by the millions from the tropics, and the dried nut-meat, known as "copra" is exported by hundreds and thousands of tons. It is largely used as a basis for making soap, tho we probably know it better in shredded form as it enriches our cakes and candies.

The palm's precious life-carrying organ, the seed, is well protected by a thick husk of coarse fibers (which serve man for many purposes). This husk protects the seed from many kinds of animals as well as from fungous and bacterial diseases. It also serves as a buoy which has doubtless carried the nut in many a long ocean voyage, resulting in its dispersal completely around the earth in the equatorial belt, and it has reached the most remote islands of the tropic seas. It is evidently impervious to sea-water. The shell, itself, is comparatively thin, but very strong, owing both to its shape and its texture. It is provided with three germinating pores or holes, thru any one of which the germinating embryo may sprout. The embryo itself, is large and well formed, ready to make a quick, strong growth, and nature has provided it with an abundant store of nourishment to endow this start, in the form of a large endosperm. We can all attest nature's generosity in this regard, for it is from this part that we obtain the meat of the coconut to supply our wants.

At first this store of food is in the form of a whitish water and in this form it is greatly esteemed as a beverage. Indeed, the coconut was used as an emblem of the Prohibition Party in Porto Rico at the time of the campaign to abolish the liquor traffic.

Later, the fluid becomes milky, then solidifies into the endosperm we have described.

I know that every person has his own preferences and favorites amongst the trees, basing his sentiments on real or fancied merits. I have my own amongst the trees of the temperate zone and doubtless from lifelong associations they will always be dearest to me, but search the world over and I doubt if a plant can be found with the majestic proportions of a tree that combines in itself so many qualities of beauty and usefulness and structural perfection as the coco palm. All hail, thou king of plants!

The Appeal of the Bird to the Child.

LAURA B. DURAND.
Deputy game warden of Ontario.

Several years ago the present writer determined to organize the children of this Dominion into local clubs for the study of bird-life and the protection of beneficial and interesting species. To this end she founded the Canadian Society for the Protection of Birds in November 1913. It was suggested that the Society adopt a native species of bird as crest, and the White Throated Sparrow was chosen. The five pure notes of this bird sounding like "Dear, dear, Can-a-da"—suggested to an assisting ornithologist the words as Motto: "I sing of Thee, Canada." This phrase was Latinized to read "Te Canada Cano."

We issued an attractive blue membership card, distributed free of charge to all school children, inscribed with a pledge which reads:

"In becoming a member of the Canadian Society for the Protection of Birds I pledge myself to protect all useful wild birds from their enemies by every means within my power; to promote the study of their life, and to influence others to do the same."

Members sign this card and retain it. We issued a charming pin adorned with the head of the White Throat in the posture of singing.

Through several denominational junior publications the Society and its objects were brought to the attention of children all over Canada. The response from them was remarkable. No inducement was offered to become a member but the card and pin, a leaflet on building bird boxes, and a copy of Buckland's report on "The Value of Birds to Man."

At the close of the war the Society proceeded to provide for children's bird clubs. Regulations were drafted for officers and raising funds. This campaign has been confined to Ontario on account of lack of means and of workers to extend it.

Realizing the value to children of the co-operation of older persons, the constitution of our Junior Bird Lovers' Clubs calls for a Counsellor, and suggests the teacher in this capacity, and for Patrons, and suggests public minded citizens of the neighborhood.

In order to stimulate the interest of schools and teachers the present writer arranged to visit the schools accompanied by a full equipment for delivering illustrated addresses. This endeavor was begun little more than a year ago. While many Junior clubs are formed as the result of these visits and addresses, others are formed on the furnishing of supplies, the members eagerly awaiting the promised visit and address. There is scarcely a centre of any consequence in Ontario which lacks several junior members of this Society. Enthusiam on the part of the children follows the visits of the Secretary on every occasion, and organization, wherever they find leadership. The most marked results ensue in rural schools where the attendance is frequently not above a score of children.

In one of these diminutive and quaint resorts of local learning and culture—readily indentified from a distance by their little bell towers and isolation,—I saw last June a lovely instance of the appeal of birds to children. This Peter Pan school is situated on the ninth concession of the township of Beverley in the county of Wentworth. It has a fairly deep porch, where the children lunch on rainy days, and a wooden cornice runs under its shelter, across the front of the building, and above the entrance. Supported by this cornice, was a long row of the nests of barn swallows, filled with nestlings, to which the parent birds brought food uninterruptedly. The nests were not of the customary

gourd shape, but open, as a Phoebe's. All were crowded, the soft-eyed younglings looking down at us with unconcern. I was greatly astonished and touched, and expressed my feelings. The principal, a young woman in the early twenties, took the domestication of the swallows as a matter of course. "Why, the swallows have been here for years," she said. "They were here, just the same when I was a child and attended this school. They know they are safe here, and return every spring. The children like to have them."

In the course of my address to the pupils at that school, I related the legend of the cliff swallows by which the origin of these birds is accounted for by the Eskimo of Labrador. They tell that the swallows were once their own children who played at making mud houses on the sandy cliffs, and one windy morning were blown into the air and changed into birds. They have never forgotten their play, and still make mud houses.

Many charming instances of the confidence of the robins in man's protection have been related to me in my work. On the fire escape of the large Public School in Dundas one of these birds built her nest and brooded while the children played around her. The young were ready to leave when all were destroyed by a cat. This ancient town, I may add, is famed for its colony of purple martins which for seventy years have built in a cornice of a store on the main street, which is musical from their rich notes and beautiful by their gleaming plumage.

(Then followed details of junior club formation at many points in Ontario, of more local interest.)

Some years ago Prof. Bigelow threw a bomb into the midst of the enthusiasts in nature-study with an article in the NATURE-STUDY REVIEW frankly skeptical as to the native interest of children in natural objects. He seems to have been supported in his theory by several experts. He had perceived no innate sympathetic interest, later to develop into the naturalist's outlook, in the average small boy, he wrote.

My experience, both as editor of "The Circle of Young Canada," a department I created in the *Globe*, and as Secretary of this Society, has been the reverse.

It is in the period of childhood, before education has closed the door of spontaneity, they I look for the native sympathy with bird life from children.

If we can reach them—under twelve at most—they are won for the birds forever. Later, sophistication has begun its indurating work. The adolescent boy and girl are absorbed in other matters. I meet with the indifference or tepid interest of high school pupils constantly. It is significant that our recruits are largely from the primary grades.

(The speaker then gave details of her method of presenting her matter to children, adapting it to their ages.)

All classes are captivated by the romance of bird life and exhibition of the emotions. One picture of a combat between an enraged mother Great Blue Heron and a Fisher (Mustela Canadensis) enthralls them. The suggestion of movement on the screen arrests attention. Action certainly is more effective than immobility. Incidents of the domestic life and relations of birds also captivate all grades. The big school boys who operate my lantern in the addresses to the successive classes, often confess that they enjoy most the pictures shown to the little children and the accompanying stories.

Thus the analogies of bird life with their own experiences impress the children deeply. The recognition of the joys and sorrows of the bird, and of its *memory* of its home and human friends, endears these beings to humankind. It is the evidence of their possession of so many qualities in common with our own that makes up a large part of the appeal of birds to children.

Then, the melody and merriment of our song birds make these most attractive for study to children. This explains the popularity of the Robin, of the Baltimore Oriole, of the House Wren and of the jolly Flicker.

Novelty also has an appeal in such species as the Common Loon, the Marsh Hawk, the Screech Owl and the Fish Hawk. Bright colors in the plumage entrance the children. Contrasted size, as between the Albatross and the Humming-bird, the Crow and the Brown Creeper, impresses them greatly. I sometimes pass around the skin of the last-named tiny bird, one I picked up under a telegraph wire and had preserved.

The sea-birds do not appeal to the inland child, and I never now show the auk, puffin, penguin and like species to children. They notice only their grotesqueness.

Flight makes a powerful appeal. When I ask, "What has a bird that we have not?" fifty hands are raised with the reply, "wings." I show as many birds in characteristic flight as time permits, presenting this feature as a means of identification to the older boys and girls.

"I wish I could fly"—is one of the most commonly expressed desires of children. They follow with eyes of longing the spring of the birds into the air, its soar and sail among the clouds. The mystery of its disappearance and reappearance corresponds with the fresh and thronging impressions of the objective world upon the wondering mind. It is the credulity which accepts magic lamps, and carpets, and fairies in flowers. Only by magic, surely, could so tiny a thing as a gold finch emit so loud a song!

Perhaps the most impressive of all my pictures and tales are those of the friendship of man and birds, of furnishing nesting material, of summer bathing devices and winter feeding.

* * * * * *

Now, while examination admits that imitation of and suggestion from older persons probably plays a part in arousing interest in birds among children, beyond doubt the memory-images, rooted in the subconscious mind of childhood, and more vividly than in later life, constitute the real source. Psychologists hold that the subconscious elements form nine-tenths of our whole mind, and that our conscious mind is continually digging up out of that exhaustless mine strange survivals and reminiscences. There, too, we cache the records of our individual childish interests, griefs, worries and fears, to which the new psychology, and the new therapeutics, trace, as to "secret springs," so many adult diseases and detriments, physical, mental and moral.

What ravages time makes upon our faces! How painfully one is struck by the results of the narrowing and hardening of sophistication upon the faces of childhood—companions on meeting them in later life. How few are sweetened and mellowed by living. Yet, I think this evil may be lessened, if not averted, by maintaining a sympathy with nature.

It was probably such an experience that led Godwin to write: "The earth is the great Bridewell of the universe, where spirits descended from Heaven are committed to drudgery and hard labor."

* * * * * *

However, it must be kept in mind, that men are responsible for the social institutions and conventions which control that hardening and narrowing process of their souls, and may change them if they choose.

* * * * * *

The association of children with birds is one of the most charming features of the literature of all peoples, and there is none in which something memorable of this nature does not occur. I might quote from the Talmud to Barrie, who has immortalized Kensington Gardens and its birds in his delightful tale of David's metamorphosis.

The fanciful attribution of birth, met with in the traditions and myths of primitive people, is frequently associated with birds. Modern poets maintain the lovely fiction. Lytton writes to "little Ella:"

> "I know not . . . what the flowers
> Said to you then. . . . .
> And why the black bird in our laurel bowers
> Spoke to you only . . . . . .
> It was not strange these creatures loved you so,
> And told you all. 'Twas not so long ago
> You were yourself a bird, or else a flower."

Simile, indeed, would fail us could we not report the likeness between children, birds, and spring. This association is remarkable in folk-lore, and I need not remind you that in that storehouse is to be found the transmitted experience of our race.

The secrect of the appeal of the bird to the child lies in the utter artlessness of both, in their spontaneity, in their unspoiled joy in living, in their liberty to range the world untrammelled, the bird on its wings, the child on imagination and on dreams, and in the ideal of home of both, sheltered by the mother.

That deepest and clearest of thinkers, Emerson, observes this association in his lines in May Day:

> "Beloved of children, bards and spring,
> O birds, your perfect virtues bring."

Sense Training

ROLAND C. ROSS

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Music and art develop the ear and eye but there are five senses, five roads from without to within. Feeling, smelling, tasting, each contribute to successful and pleasurable living.

The following sense games are offered to primary teachers, as aids in all 'round sense training and as lessons which are fun. Their use will suggest quite sensible methods in studying the regular subjects of the year's course in nature-study. Then, when studying the goat or cow, the feel of the hair or the smell will be recognized to be just as characteristic as the horns or the voice.

FEELING

These are "blind man" games. In a box place one or two kinds of vegetables, or fruits, or later a series of "useful objects." Tell the class the subject as; fruits. One by one they feel in the box and whisper to the teacher what they are. Either have eyes shut or use a large paper cap blindfold. No cloth. Keeping score by sides keeps things moving.

Pass kinds of cloth as silk, velvet, burlap; and papers, as waxed, tissue, etc. Again pass them with eyes shut.

Feel difference between apple and plum; between beans, peas, fig and pear, orange and peach, etc.

Compare the "feel" of ivy with geranium; or hoarhound with cheeseweed.

Touch lightly both cheeks at once with ice on one side and metal on other. Which is warmer?

Always get the feel of new things, as trees, weeds, animals—"eyes shut!"

SMELLING

Another way a blind man "sees." With eyes shut pass (by monitors) an object which is to be smelled. Use onions, orange, peanuts, lemon; camphor and eucalyptus leaves; apple, etc.; and walnut shucks. Constantly test your hand lest it carry an

odor foreign to the object being passed. Crush the leaves and open the fruit.

Bottles of extract, simple perfumes, camphor, rose-water, turpentine, coffee, kerosene and peppermint. Use singly at first. Later test with a series of two or three. This is quite confusing to some.

Learn every flower by smell without seeing or feeling. Primary children get the following wild plants easily by smell. Sage, sagebrush, Jimpson weed (poison), turpentine-weed (Romero or Blue curls), chokeweed (tarweed), anise, etc.

Can you tell a teamster, a dairyman, garbage wagon or a wet dog without seeing the object?

Wild animals save their lives by scenting unseen danger. Many woodsmen read with the nose. Read David Grayson's books. Test odors at the Circus, Zoo, etc., for families, as cat, ape, cattle, and other groups.

Tasting

What proves the pudding is good? Taste saves animals from some poisonous plants. With eyes shut and hands down, drop in the child's mouth a wee slice of fruit. Use familiar ones first. Try salt, sugar, extracts, spices and oils as peppermint.

Hearing

1st game: To locate direction of sound. Tap or speak in one corner, then another, etc. Have monitors in the corners or sides of room who will make the sound at your signal.

2d: Recognize *source* of sound as, of glass, wood, canvas, book, rain, brass, pottery, paper.

3d: Blindfold one, another speaks a word, or sentence, or sings a bit of song. Blindman recognizes the one speaking. Play "Echo game." Recognize the one who is echo.

4th: Repeat, but the speaker may speak in an unnatural tone. The timbre or quality will not be much changed and the object is to recognize quality and not the pitch or loudness.

5th: Note different qualities of animal voices as pigeons vs. linnet; cows vs. goats. Imitate such differences and begin to dramatize with freedom in these early years.

6th: Call attention even for a moment to nature voices; wind, a tree, a bird, a bee. Even a fly contributes his buzz.

SEEING

1. Place five objects on a table—one look, then tell the *order* of arrangement. Later six, or seven. At first only three.

2. Ten objects. Tell *what* you saw.

3. Draw objects on board leaving out some fundamental part as the nose of a face, or handle to cup, or shadow of an object when rest of the picture shows shadows. Child to complete the figure.

4. *Seeing is the final test of a newly learned flower, seed or animal.* Exhibit as review things studied and expect prompt response with the names.

Alone in the Woods

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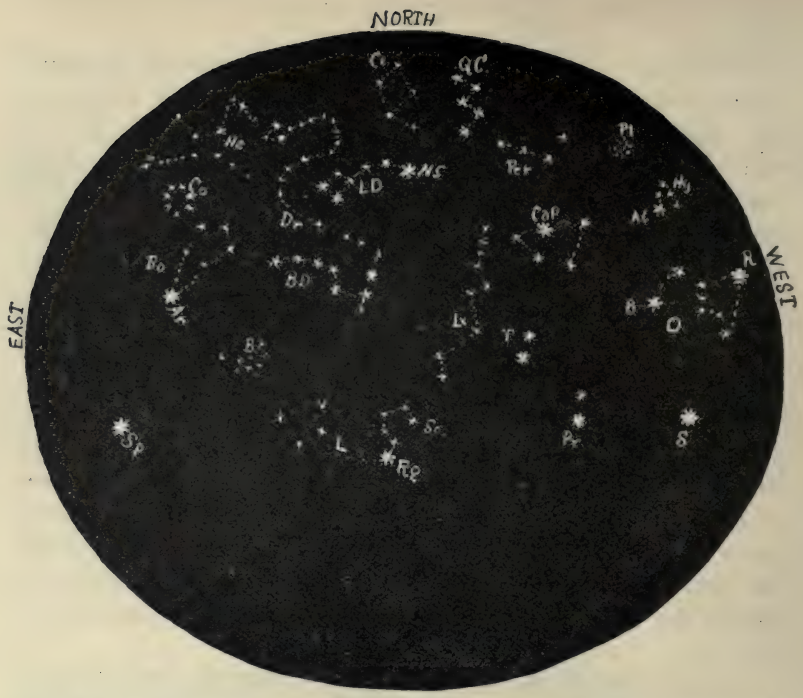
Field trips when nature students go out together are wonderful sources of education and enjoyment. Yet there are some who can get close to the heart of nature only when alone. When several go out for a field trip there is a freedom and comradeship in the exchange of ideas and notes and a satisfaction in present observations when verified by more than one witness. Yet one can get real close to the heart, and understand the language of nature better when alone.

Why alone? Because one can hear the voice of nature only when not talking of things. One can see nature as it is given to no other mind to comprehend, when not diverted by the thoughts of another. One can approach more closely and understand better the intentions of wild life when in the harmony of undisturbed surroundings. For these reasons, and many others, it is well to make frequent excursions to some quiet ravine or dense woodland or a shaded spot near a creek or pond and resting the body and mind become as nearly inactive as possible. Perhaps it would be well to not even think but just quietly wait letting the mind roam at will. The attention may be called to the gentle motion among the trees, a passing cloud, the soft air filled with fragance, or any of the unnumbered influences that are ever

present when one is in tune with them. It is then the universal language can be understood and the trees will speak to you as they speak to each other; as they speak to the beasts, and the beasts among themselves. It is then we learn not only facts about nature, but we may forget all trouble and even the passing of time, and enjoy as do the wild things. The hills, the fresh air, and all wild life are our best, our wisest friends. How sweet the ministry of the woods. The trees are fresh and full of life. They sway and rustle and their swaying and their rustling soothe and comfort like the voice of a mother comforts her child.

A sickly, tired, selfish, and discouraged woman took her son, twelve years old, as her only companion, and went to the woods where they spent fifteen days and nights alone. Her boy amused himself boating and swimming while she spent the days and often a part of the night learning to understand the great law of love where spite and cruelty are unknown. She forgot to worry, when she looked into a brown thrush's nest and six old birds came to protect the four baby thrushes. There she learned community service.

Her discouragement vanished when she watched the happiness of the birds building their nests, feeding their young, and all singing songs of rejoicing over work well done. She learned to relax her tired body and enjoy complete rest, in the quiet isolation from civilized excitement, and the perfect harmony of all her surroundings which were constantly unfolding and could never become monotonous. When she understood the superficial, she looked for the more hidden treasures of understanding in the ways of wild life. It was as though she entered a new world. Where before she only saw, she now understood why. Why the leaves drop from the trees. Why one bird builds its nest in the top of a tree and another on the ground. Why all wild things were afraid of her and how to avoid causing them to fear. After two weeks in the woods, she came forth rested, and with a new and broader view of life. A real lover of nature. Not only wild nature but with a deeper sympathy and understanding of human nature. For after all, there is but one great law of nature which is the law of love. And God is love. There is nothing so restful as love. Who has not heard the loving call of nature that is so hard to resist? The more we know the great outdoors, the stronger the call. The stronger the call the more satisfactory the rest alone in the woods.



Hold the map above your head, the top at the north and you facing the south, and hunt out each constellation in the sky that is figured on the map. There will be many more stars in the sky than are shown on the map, but the figures given will prevent confusion.

Explanation of Star Map

Ar. Arcturus in Bootes
Al. Aldebaran in Hyades
B. Betelgeuse in Orion
B. D. Big Dipper
B. H. Bernice's Hair
Bo. Bootes
Cap. Capella
Ce. Cepheus
Co. Corona, Northern Crown
Dr. Dragon
He. Hercules
Hy. Hyades
L. Leo, the Lion
L. D. Little Dipper
Lx. Lynx
N. S. North Star
O. Orion
Per. Perseus
Pl. Pleiades
Pr. Procyon, the Little Dog Star
Q. C. Queen Cassiopeia's Chair
Rg. Regulus, in the Sickle
S. Sirius, the Big Dog Star
Sc. Sickle, a part of Leo
Sp. Spica
T. Twins

The map is for the last of March and early April, when magnificent Orion hangs low in the western sky in the early evening, and with him the Pleiades, Aldebaran, and the two Dog Stars; the Twins shine serenely above them, with brilliant Capella to the north of them. The Big Dipper is almost above our heads; if we imagine the Dipper handle prolonged twice its length, keeping its curve it will end in bright Arcturus; and if we prolong it as far again it will end in Spica low in the south-east. The Sickle is high in the heavens and shows well its great star in the handle which is Regulus. The Sickle is part of Leo. The Queen's Chair is low in the North.

THE NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN ELEMENTARY SCHOOLS

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Editorial

TORONTO.

The meeting of the American Association for the Advancement of Science in Toronto during the Holidays was a most interesting occasion. There was a large attendance, for most of us find pleasure in visiting another country even though so near to us as Canada, which is surely "another country" although we are first cousins to the Canadians in interests, enterprise, ways of thought and of living. Toronto has a more solid and dignified architecture than any of our cities of comparable size. The buildings of Toronto University are especially beautiful and give one the feeling of permanency which in itself is restful. Its dormitories and great chapel-like student mess halls are reminiscent of Oxford and Cambridge; Hart House, a magnificent gift from the Masseys, is a far more extensive and magnificent building than the Student Unions of any of our universities can boast; its splendid dining hall, its charming theater, music room, library, assembly rooms, and innumerable rooms for various athletic activities and especially its vast marble swimming pool make it an ideal toward which other universities will strive.

The Toronto people proved perfect as hosts; the most gracious attentions were showered upon the visiting scientists and we all came away with our hearts very warm toward our Canadian friends and colleagues and the visit to Toronto will remain among our most delightful and cherished memories.

The Sixteenth Annual Meeting of the American Nature-Study Society

Held in Toronto, Canada, Thursday, December 29, 1921

The meeting was called to order by President Drushel shortly after ten o'clock and since the morning session was in charge of the Canadians, Professor MacReady was called to the chair and presided in a most cordial and pleasing manner until the end of this session. He told us that he at present has charge of the Juinor Red Cross work and that in health instruction he found the nature-study methods more effectual than any other.

The first paper was by Professor Tuke of Haileybury, Ont. and was a scholarly and masterful plea for more careful observation of "Sky Phenomena." Next was an address by Miss Laura B. Durand, Deputy Game Warden of Ontario on "The Appeal of Bird-life to Children." Miss Durand explained that her work was entirely educational and that she had been made Deputy Game Warden to give her the right to put up posters and notices etc. She is certaintly an interesting and enthusiastic worker and is doing much for nature-study in Ontario. The last address of the morning was by Dr. J. D. Detwiler now Assistant Professor of Biology in Ontario Western University and formerly Instructor in Nature-study of the Farm at Cornell. Dr. Detwiler's broad experience in this work added great weight to his plea for Nature-study as means of aesthetic education of the farm child.

The afternoon session began with moving pictures of animals and insects that were most remarkable. We shall always regard with great respect the mud wasp after having seen how skillfully she builds her nest. This exhibit was given by Professor F. R. Moulton of Chicago University. It is now possible for teachers of biology to secure these reels which cover a wide range of plant and animal life, to show to their classes if they have the outfit for presenting them. The cost is very reasonable and the pictures are as instructive as they are wonderful. Following the pictures Dr. E. L. Palmer discussed very interestingly "A system for caring for some of Children's Nature-study

Interests." Then Dr. Margaret E. Noonan told us lucidly of the advantages of "The Project Organization in the Primary Grades." The last address of the afternoon was that of Professor Vinal who told us with his characteristic earnestness and animation of the great opportunity of nature teaching in the summer camps.

Edith Patch of Orono, Me. whose books on insects and birds are of so great use to us was there as were Mr. and Mrs Satterthwait of Webster Groves, Mo., Dr. Dandeno of Ontario Dept. of Education and others equally important and helpful. The great disappointment of the day was occasioned by the absence of Professor Dearness who was just recovering from a severe illness. We also deeply regretted that Dr. Downing was not with us to give us his paper and his encouragement: he was kept at home by illness in his family.

After the report of the Secretary-Editor the following officers were elected:

President: WILLIAM GOULD VINAL, *Providence, Rhode Island.* Vice-Presidents: J. A. DRUSHEL (*Missouri*), M. R. VANCLEVE (*Ohio*), E. L. PALMER (*New York*), J. D. DETWILER (*Ontario*), SUSAN SIPE ALBURTIS (*District Columbia*).

Directors for two years: MRS. W. A. ROWLEE (*Illinois*), W. T. HEILMAN (*Ohio*), E. E. BALCOMB (*California*), H. S. BRODE (*Washington*), G. H. TRAFTON (*Minnesota*), A. F. SATTERTHWAIT (*Missouri*), THEODOSIA HADLEY (*Michigan*), J. M. SHAVER (*Tennessee*).

Secretary-Treasurer-Editor: ANNA BOTSFORD COMSTOCK, *Ithaca, New York.*

How and Why Stories, John Casper Branner, President Emeritus of Stanford University, 104 pp., illustrated, Henry Holt & Co.

If you wish to forget all your troubles and worries and spend a perfectly happy hour, read this little volume. Dr. Branner explains how he came to know these stories: "I was born in the South 'befo'de wah, and as my parents were slave holders, I grew up among the negroes. To me they seemed vastly more interesting and human than white folks. During my early childhood negro women were my nurses and keepers all day long and it required a lot of parental authority and something else I decline to name, to keep me away from their cabins at night." "I am often asked if they are African folk-lore stories brought to this country by the slaves: They are too clearly under the influence of biblical history to have had such an origin."

The stories deal with the creation of the world and especially the characteristics of the common animals and birds: Why the Snake has no Feet; Why the Owl Stays up Nights; Why the Catfish has no Scales; Why the Pig Grunts; Why the the Crawfish goes Backwards; Why the Snail is so Slow; Why the Polecat Smells so; Why the Crane is so Long; Why the Wild Geese Fly that Way; How the Turtle came by a Shell; How the Tadpole Lost his Tail; Some of the stories are cosmic as: How the Stars Were Made. Whatever the subject of the story, it always has a very human application; it begins with an admonition and ends with a cogent moral. For instance the story, Why the Birds are of different colors begins "Whateva you rub up against in dis worl' some of it's gwine to stick to you, honey. An' what's mo' when folks looks at you dey mos' giner'ly knows what you bin, and who you's bin a'sociatin' wid." Then follows a graphic account of the flood and Noah and the ark and tells how the Lord piled up the clouds and painted a rainbow upon it. "Well, suh, when the Good Lawd got de rainbow all done finished he waved his han'todes de big rainbow, an' he hollered to ole Mr. Noah, "Dah's my promise."

Wid dem words he retch over, he did, an' lif' off de whole roof o' de ark, an 'de birds dat had been a roostin' in de attic rose all togedder in one big cloud, an' flew todes de big rainbow up in de sky. An dey was all so glad, dat dey crowded up onto de rainbow an' flew right spang through it, while it was all covered wid de colors o' dat fresh paint. An' all de birds dat flew agin' de blue color come out blue birds, an' dem dat flew agin' de red color come out red birds, an' dem dat flew agin' de yaller color come out yaller birds. But some of 'em feel so happy dey sort o' wallered aroun' in de rainbow an' dey come out all striped and speckled wid de different kinds of colors. An' de hummin' birds dey flew so fast, an' darted into sich little holes dat dey got all de colors o' de whole rainbow on dey feathers. An' de birds dat flew off on de other side o' de ark an' missed de rainbow or was scrouged out by de rest of 'em, dey all stayed white jis like dey was befo'dey came out'n de ark. An' all de birds in de whole worl' from dat time on bin colored des like de ones dat flew into de Good Lawd's rainbow. An' dat's what make me tell you, honey, dat you better be careful what kind o' paint you rub aginst in dis worl' cause it's gwine to stick to you an' it's a gwine to stick to your chillen too."

The illustrations are clever and felicitous; and while the stories are interesting in themselves, Dr. Branner's sense of humor and his literary skill form a beautiful transparent, amber embedding them which will preserve them for all time.

Nature-Study Agriculture, William T. Skilling, Supervisor of Nature-Study and Agriculture, State Normal School, San Diego, California, 332 pp. illustrated, World Book Co.

The teacher of Elementary Agriculture who neglects the nature-study phase of the subject will never be truly successful. Professor Skilling has realized this and every lesson in this valuable volume is based upon nature-study. While it is, in a way, a self teaching book, yet the aids to the teacher are many and potent. Along the margins of the pages are summaries which will suggest questions and discussions of the topics. At the end of every chapter are directions for experiments and observations that have direct bearing on the lesson. While it was written by a California teacher, it is a book usable in any place for its lessons are fun-

damental rather than regional. There are many illustrations that vivify the text. The following lessons are included:

I The Nature of Plants; II The Food of Plants; III The Soil and Soil Water; IV Soil Fertility and its Preservation; V Cultivation and Drainage; VI The Propagation and Care of Plants; VII The Improvement of Crop Plants; VIII Farm Management and Farm Crops; IX Vegetable Gardening; X Oranamental Gardening; XI Dry Farming and Irrigation; XII Supplying Soil Needs; XIII Insect Enemies and Allies; XIV The Farmer's Feathered Helpers; XV The Smallest of Living Things; XVI The Herd and the Dairy; XVII Farm Animals and the Principles of Feeding; XVIII Poultry Keeping. The book is a direct help in methods as well as in classroom and laboratory. We predict that it will be used widely.

The Bird Poems of Miles A. Davis with introduction by Gilbert Pearson, 37pp., printed by The Roycrofters at East Aurora, N.Y., published by John White Johnston, Rochester, N.Y.

A tiny volume this but every page of it pays loving, poetic tribute to our bird friends. The robin, bluebird, oriole, oven-bird hummingbird, bob-o-link, wood thrush, mockingbird, chickadee, petrel, wild geese, snow birds are all given poems that show the author knows his birds by heart as well as by mind. Many are the felicitous stanzas that will make this booklet cherished by bird lovers.

Take this of the bluebird:

He brings the sunshine in his song;
Whatever tender memories float
In rapture from his tuneful throat,
His wings have touched both hemispheres
Of sun and snow, of smiles and tears.

And this of the oriole:

The sunset and the dawn appear
Upon his smoothly rounded breast,

And this of the bob-o-link:

A stalk of grass to poise his wing;
The only creature that can sing
A full orchestral symphony

With roistering rounded harmony,
Vibrating every chord and note
That gushes from his throbbing throat.

Perhaps the best poem in the volume is that on Birds' Beatitude. I think we have all wondered what heaven would be like if there were no birds there, and in the paradise the poet pictures, the beloved birds dwell.

Nature-Study for Boys and Girls, John Bradford Craig, Fifth Ave. High School, Pittsburgh, Penn. Five volumes, illustrated. McIndoo Pub.

Four of these volumes are readers for the third, fourth, fifth and sixth grades and have about 150 pages each. The other volume contains 224 pages and is a Teacher's Manual, giving assistance for each of the lessons in the other books. While these little volumes are essentially readers, they are planned to stimulate the children to observe for themselves and to interest them in the common animals and plants of their environment. Each lesson begins with a list of words that may be used for a spelling lesson if the teacher so desires and each lesson is followed by a list of questions concerning the facts brought out in the texts. To make these readers of greatest use the subject matter of each lesson should be under the direct observation of the pupils. It will take an out-of-doors loving teacher to get the best results in using these books, for they are not meant for mere readers and should not be allowed to degenerate into such. For such a teacher they will be most helpful, for they cover a wide range of subjects and the style and plan of each book are adapted for the grade for which it was written. The illustrations are many and attractive.

Nature Notebook Series

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Devoted to Elementary Science in The Schools

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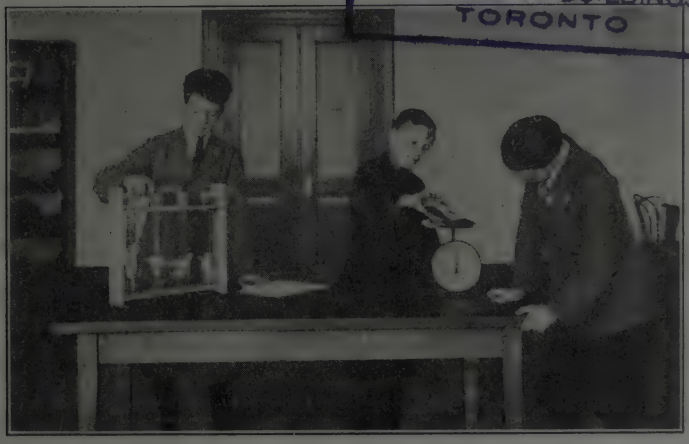

Discoveries in Soil Behavior Worked Out in Careful Tests, Brooklyn Botanic Garden

MARCH, 1922

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THE
NATURE-STUDY REVIEW

VOL. 18 · MARCH, 1922 · NO. 3

School Garden Work in 1922

ELLEN EDDY SHAW
Curator of Elementary Instruction, Brooklyn Botanic Gardens

If all the garden teachers and supervisors of the United States of America could and would this year unite on a purely educational campaign, the future of garden work would be assured in our country. Our garden work has suffered, as everything else has suffered, not only from its own sins of omission and commission, but from the effects of the war. The garden interest was high and the greatest mistake ever made in its movement up to the present time was this: that we failed to consider our children's garden work during the war as an educational matter, but put it on a utility basis forgetting that if we had used our soundest educational principles and worked from that end the results would have been not only as good as those obtained the other way, but overwhelmingly better. Then too, if children's gardening is a subject which can be taught just as well by an untrained person whose great grandfather once happened to pass by a farm in early youth, and thus handed the feeling for a farm down through generations, if such people were as well able or were even considered competent to teach children gardening, then indeed the subject of gardening had better be dropped from our curriculum. Gardening is but one phase of nature-study. Educators have endeavored to take it apart from nature-study and set it aside as a thing by itself. No subject can live when isolated. Gardening is only a valuable phase of nature-study when used to supplement and become a part of other subjects in our school curriculum. The greatest educational point to bear upon as an argument for the value of the school garden is this: in a school garden a child experiences real things under real conditons. I do not look upon the school garden as a nature laboratory, purely and simply. I look upon it as a place of reality where one is not performing experiments to solve a problem as he would do in a laboratory, but where one

is handling real things under real conditions. Therefore, the mental life of the child is stimulated, his mind opens to the questions which nature asks him and interest is never forced. Here observation is natural. We all remember the old type of normal school lesson plan in which one of the steps was observation—a step often forced so that it became a side issue. In the garden with the increasing interest developed from the growth of real and living things, observation must naturally be stimulated. You can scarcely walk through a garden and not stop here and there to observe some interesting phenomenon of life.

During the season of 1921, we took from our children's garden area of about three-quarters of an acre, at the Brooklyn Botanic Garden $3,220.97 worth of crop. We did not start out to make that sum. We started out to do the best gardening that could possibly be done under our given conditions. We gained our results through the most careful work and observation of such rules as those we should follow through life, as, neatness, precision, dependence upon self, and obedience to simple directions. The other factors which made it possible to obtain these results were those brought about by actually studying our problems so that not an inch of ground was idle; so that one crop followed another crop, and the crops which were used were studied carefully so that they succeeded the right crops and made not too heavy demands upon the soil. Very small matters indeed contribute to the real success of work.

Our training for the 1921 garden started weeks before the garden was open. It started in our Saturday morning classes where the beginners were taught exactly what crops were to be planted first and why. Then lessons were given on depth of planting, on spacing and on the plan of the garden. This plan is made on the floor and is exactly the size of the plot the child is to have. The class sits around in the form of a circle as the children in the kindergarten do, and the different places for the drills are measured off; the seeds are placed upon the floor. By this arrangement, the child receives a feeling of exact size, photographs on his brain a plan of that garden and becomes proficient in measuring off his distances. He also knows the order and proper sequence of planting his crops so that that lesson does not have to be taught him in the field. He knows every seed by sight and feeling

A garden pest,—what does it look like? How can it be controlled?

Our tool house. Note the cubby holes for small tools and measuring lines.
A place for everything and everything in its place
Brooklyn Botanic Garden

just as we learn to know any other object. I believe it is most important that the garden material be as familiar to the child as the materials he uses in basketry, cookery, woodwork, or any other subject in the school curriculum. When I was connected with the Rochester City Normal School, this early spring work used to form a basis for arithmetic, drawing, spelling, and language, just as it should. I would have all during the spring, bottles of seeds in the classrooms, experiments performed in germination, so that the children might know about the number of days it would take before the different seeds come popping up in the garden under ordinary conditions. In order that children may experience a feeling of the right depth in planting, I use a flat and the classes plant a model garden. The flat is about one-tenth of the size of the outdoor garden bed so that the boys and girls who are ready for problems in arithmetic, work this out quite carefully. The others merely take their directions and the little model garden is planted in exactly the same way in which the outdoor garden will be planted. We can get in this way the exact depth and spacing in ratio to the size of the bed. The older boys and girls make their own plans drawn to scale. Another piece of work which was done in the upper grades in Rochester was that of the older boys and girls in making large plans, one for each classroom and putting in the area which was to go to a given class in red pencil, so that Grade Four saw not only the plan of the whole school garden, but its own area set off in color. Unless the garden is to be a vital real thing in the school work no time should be given to it. That is why it is so important and essential to have the right teachers. We would not choose a woman to teach singing because she happened to have just a liking for singing, but no training. We would not choose a man for manual training because his grandfather had happened to be a carpenter. When all superintendents of schools and all principals of schools in our country insist whenever they have a nature-study teacher on having a trained one, not only trained in the subject, but trained in general education, then there will be no question concerning the place of nature-study in our schools.

We are sometimes criticized here at our Garden for being too fussy, too particular about little things. I wonder if that could possibly be true! Does not all the difference in good work and poor

work lie almost entirely in thought for the small things? As our children enter the garden house for a session each child registers his attendance for himself. A large calendar hangs directly over the registration sheets, yet it sometimes takes almost an entire summer before a given child will cease asking the keeper of the house whether it be a teacher or an older boy or girl, the date, I might add here that he is never told the date. This is a little thing, and yet all through life we meet these people who are constantly depending on others for the simplest things. After registering the child goes straight to the bulletin board to read the directions for the day. He does not stop first and choose his tools, but chooses them according to what the day's work is to be, set forth on the bulletin board. This is a small point but it is training in taking a direction and putting it into effect.

We have made it our business to see that the beginners in the garden cover certain lessons which are fundamental in gardening, such as learning how to plant different kinds of crops, spacing, thinning, transplanting, cultivating, a caring for paths and beds, cleaning of tools, winding up of measuring cords neatly and efficiently. These beginners lessons once learned are a basis for advanced nature work. It is just as stupid to keep teaching children the same garden lessons as it would be to teach the same lessons on fractions for four years. The only point of learning a lesson is either for mental training or to give information to put to work or both. Our tool house we keep as immaculate as a parlor and at the beginning of the season and sometimes all through the season, tools are inspected before they are hung up. Each person must clean and hang up his own tools. We rarely ever have a tool put anywhere but in its own place. This comes from training and from standards.

The older boys and girls plant their gardens entirely from their own plans taking them into the garden with them; then as the season goes on they check up the errors in judgment they have made. The plans are discussed with them both before and after they are made. Most always they see radical mistakes but very often smaller mistakes are permitted to go through in order that the boy or girl may benefit from his mistake and not from information given him by a teacher or obtained from a book, although both of these sources are permissible checks. The school garden

always has the problem of juggling distances in planting and in spacing because of the small areas allotted for the work. That adds considerable zest to the game.

In garden work which is directly tied up with a school there comes a great satisfaction because one can put all results to use and handle them in so many different avenues of usefulness—in connection with a live art department, a helpful manual training course, the real thing in the cooking class,— all these aiding factors make the garden a rich field of opportunity.

Finally, classroom teachers, and upon the really good classroom teacher must one depend for the full value of nature-study, are constantly asking how they can put children in the line of natural inquiry to stimulate the powers of observation. One answer to this question is "Why not consider the school garden as an opportunity for discoveries, having sets of live questions on the bulletin boards or in the classrooms similar to the following: What birds are helpful in our garden? Why are some seeds winged? Why do some flowers open late in the afternoon? What does the blossom of a radish plant look like? Look at the flowers in the flower beds and see how nature has arranged the leaves for the best lighting of the plant: make sketches to prove your answer. Hundreds of problems arise in the wake of the garden season. Some discoveries made are idle ones. Here is an opportunity to prove to children why some thinking is careless and loose: here is a chance to tie it up tight.

We must all bear in mind during 1922 that whatever of inspiration, whatever of clear thinking and of real value comes from this work is a reflection of those people who stand in the eyes of the boys and girls as their leaders. No leader can inspire without a vision, and no vision can become of eternal and lasting value unless it be founded on those things which are eternal.

The Child and the Forest

By Herbert A. Smith
Assistant Forester, U. S. Forest Service

The forest is a part of the natural heritage of childhood. If the heritage is cut off, life is that much poorer. I am thinking of a very small boy in southern New England half a century ago, and of the mysterious woods, challenging, drawing, yet a little terrifying. New England theology formidably expounded in the white-walled "meeting house" with its sky-pointing steeple, provided no place for pagan Pan, but the dim temple of the woods gave him sanctuary. You could feel him though you knew nothing of him—a touch of his "panic" fear lurked in the shades, calling for some stoutness of childish heart to tread the unknown, enticing playground.

But what a playground! You left the dusty, familiar road, passed through an old orchard and across an open hayfield, and climbed the high-reared barrier of a stone wall, to look from its summit into the leafy aisles amongst the big chestnuts, oak, and hickories of an upland wood. Or you went down the cowpaths wandering in the sweet fern, bay, and low huckleberry bushes of the pasture-lot to the dense tangle of tree growth through which crept a stream. There rank skunk cabbage and high "brakes" hid the oozy ground. You knew where that stream came out to the friendly road, to run under an old wooden bridge on whose stringers the phoebe-bird built. It was rumored—you did not quite know whether to believe anything so wonderful—there were brook trout in that stream for those who knew how to fish for them, as well as the entrancing minnows you might angle for in sunny pools with bent pin. And when happily weary at the end of a long summer's day, you watched the sun sink down in the glowing clouds to the horizon's rim, it was a wooded rim. The edge of your known world—and the forests going on and on. What lay within it, or beyond?

These things and many more I think of when I ask myself what the forest meant to one country-reared boy who would not for much fine gold surrender his share in the great heritage. I am not a school teacher; and I recognize this is a day in which

the difficult task of the school-teacher is often made harder rather than easier by well-meant but officious and ignorant outside advice. What to teach and how to teach it are matters primarily for professional educators to deal with. Nevertheless, perhaps the nature-study teachers will permit me, as one deeply interestd in their task to offer a modest thought or two, for their consideration.

It is an old saying that sometimes one fails to see the woods for the trees. To this saying I would at the moment give a two-fold application. First, tree-study is not forest-study. Secondly, if in speaking of forest-study we stress too heavily the second element in the compound word, we may fail to give the child the best part of his heritage.

Tree-study is not forest-study because the life of the forest is as different a thing from the life of individual trees as the history of a city is from the sum of the biographies of its individual citizens. The scientist sees in it a wonderful living example of biological processes. A silent but deadly struggle among individuals and species for a place in the sun—for growing-room and light— is always on, and its outcome depends on fitness to survive; while on the other hand, along with this lethal combat for individual survival a definite association of plant and animal life exists, modifying the environment for each sharer in the complex life of the forest as a whole. The forester sees presented to him the same association, but as plastic material, moldable to his own ends through the utilization of nature's forces and laws to produce what man wills.

And what does the nature-study teacher see? That depends. Perhaps plants, great and small, to be labeled with a name; perhaps life processes; perhaps flowers and birds and little running creatures, or nuts and berries and bright-hued autumn leaves, to gladden and interest an hour's excursion while sharpening the powers of observation; perhaps raw material to be converted through various industries into useful products. All these are good things to see, and helpful to the child to have shown him. But to my mind, the teacher will do well to remember also that too earnest a desire to have the child *study* nature may lead astray from the path to the child's heritage.

To get the child to know and love the woods—not trees merely; to want to know more about the forest, while all the time he grows more at home in it, and stores more deeply within himself the impressions that come from its primal appeal to the child's imagination and life; these are surely worth-while things to seek. Can they be attained? For the boys and girls who can be got into the woods, I do not see why not, provided the teacher knows how to get them there. But to be sure of getting them there the teacher must know the woods himself.

Forestry deserves the attention of educators to an extent beyond that now given it. Of our original forest area a little more than one-half remains, but much of it in badly depleted condition through abusive methods of use and the ravages of fire. The public character of the country's forest problem is too well known to require urging here. As future citizens our school children should, I think, understand the close relationship that exists between our future national welfare and the use made of the one-fourth or more of our land area which should be permanently devoted to forest. Forest production and agricultural-crop production are our two main land uses. Whether looked at from the standpoint of civics, of geography, of natural science, of economics, or of the humanistic ideal in education, the forest lays important claims to recognition. Nature-study should lay the foundations for later teaching to build on.

Already the limits set for this little paper have been overrun. What can the nature-study teacher in the big city do to give the child some small part of that natural heritage from which an artificial environment cuts him off? That is a hard question to answer satisfatorily, in short compass or in long. Yet it is perhaps worth remembering that the child's imagination will do much to supplement such material as even in a city can be supplied for actual study. Story, description, poetry, lantern-slides, motion pictures, photographs, school and museum exhibits of various kinds, can all be made to help in the building of at least a partial equivalent for what the child more fortunately situated in this respect may with the outward eye behold.

A School Fair

The Results of the Efforts of the School in Teaching Pupils the Art of Gardening.

A. G. Pennel.
Supervisor of Agriculture, Bloomfield Public Schools, Bloomfield, N. J.

At the outset, I wish to state that I believe the best results from the teaching of Elementary Agriculture in our grade schools, are to be obtained from the pupil's home-directed garden, rather from that of the school garden, and that the school garden should merely be used as the laboratory in conjunction with the work in the classroom. In the congested districts of the large cities should be the one exception. It is with the products of the pupil's home gardens, that this article has to deal.

That spirit of competition to excel one's fellows and which has really been the force behind all human progress is well taken advantage of in an exhibit of products from a home garden. When these are exhibited in our Public Schools by pupils of these schools, who have been instructed in the art of gardening, it may very properly be called "A School Fair."

What are the advantages it has to offer? The spirit of competition encourages the growing of vegetables and flowers in home gardens, and to promote the improvement of the appearance of home grounds and to better the conditions of the community at large. It provides a meeting place, where pupils from the different schools may assemble and discuss the results of their labor and also to view many varieties of both vegetables and flowers, which they may never have had the opportunity to see, for the number they are able to grow in their own garden is necessarily limited.

Whole-hearted cooperation between parents and the school is always necessary, if the school is to perform its best service and a school fair may be one means of accomplishing it.

It provides the child with pleasant, useful and healthful work during the summer months, for he now has an aim—a blue ribbon perhaps—but nevertheless an aim. He knows to obtain that prize means work. To shirk means failure; he alone is responsible.

A fair means extra work for the garden teacher, but I am frank to call this an advantage for it stimulates us to extra effort,

provides the opportunity of getting our work before the public, that they may see the real value of Elementary Agriculture as a subject to be taught in all our schools, and we as teachers,if we are to keep it in its rightful place, i.e. in the curriculum of our grade schools, have simply got to put forth an extra effort in the handling of the subject and to be ever alert to take advantage of the many opportunities offered us to show the public the result of our teaching and personally I believe the School Fair is the answer.

In planning for a fair begin as early as possible, appoint the committees necessary and see to it that the principal of the school in which the fair is to be held is a member of the committee for you will need his cooperation. Call a meeting and decide immediately upon the date of the exhibit, which should be preferably in September and be sure and inquire the average date of the first frost in your locality in deciding on the date.

Prizes should next be considered, and these should be of such nature as to carry with them the spirit of the garden movement, such as garden tools, books on gardening, agricultural journals etc. and avoid cash prizes as much as possible. Funds are not wholly necessary to the success of a fair, as I have always found manufacturers, publishers, etc. very willing to donate prizes for this work. The date having been decided upon and the prizes collected, you are now ready for the premium list, a copy of which should be in each classroom before the summer vacation, so that the pupils may know how to plan for the various classes. This classification should be as simple as possible and be so arranged as to not exclude any child. The aim should be to have every child exhibit something that he has grown even though it be but a bunch of parsley. A large number of small exhibits, rather than a few large exhibits shows the interest has been aroused and without that the fair will surely fail.

Herewith is a classification that worked out well in Bloomfield.

Best Display of Garden Vegetables. Ist, 2d, and 3d prize.

Single Varieties. One prize will be given for each variety of garden vegetable shown. Where the number of competitors warrants, a second and third prize will be given.

Specifications as to the number of the root crops in a bunch, quanitity of each vegetable shown etc. or to enlarge the premium list to include flowers, poultry etc. will have to be worked out for

each locality by the teacher. The above plan merely is given as a hint to have it as simple as possible, for remember we are only working with children, not professional gardeners.

However a scheme of this kind allows a fairly equal chance for all for even a child having but a small plot and not being able to raise a large variety of vegetables to enter in the display class, could at least grow two or three varieties such as beets, carrots, etc. and thereby enter in the single variety class.

Plans for the transportation of the exhibits should be worked out in advance and always with the idea of avoiding all unnecessary handling thus insuring the products arriving in a fresh condition. Autumn leaves, corn stalks, etc., need be the only decorations for the real object is to show what has been accomplished by the pupils, the decorations merely acting as the frame of the picture.

Have the products judged by an expert from your Agricultural College and thus avoid any dissatisfaction that perhaps might arise with a local judge. Have the fair advertised well in the local press, invitations may be printed and this work can well be done by the printing department of your High school, while the Manual Training department can add its share in the construction of the tables for the exhibits.

The teaching of Elementary Agriculture in our grade schools is surely one means of keeping the schools in constant touch with a number of the pupils, thus guiding their vacation, but never intruding so far as to interfere with their pleasure while the fair offers a place in which their work can be judged. The bulk of the garden work, coming as it does when schools are closed, does not in any way conflict with the child's book studies, nevertheless the child is learning a valuable lesson for he is taught to know and respect the soil which feeds him, something of the plant life, the value of money for he has shared in earning it, and finally he begins to realize that he is a producer and that he has contributed in a small way to his support. The past war seemed to arouse us for the time being as to its possibilities and gardening was then rapidly introduced into our schools. Are we teachers of gardening going to keep it there? I sometimes wonder. If so, we will have to give the best we have at all times and use every means available and in parting may I again urge that of the School Fair as one of the best means at hand.

School Fairs

L. A. DeWolfe
Truo, Nova Scotia

School Fairs will not be of value educationally until they represent every phase of Home and School work *for the whole year*. To secure this, there must be close co-operation between the parent and the teacher. Preparations must also begin at the beginning of the year.

One reform is vitally needed before School Fairs can be successful. That is, *we must make the school year coincide with the* calendar year. In such case, we should then have the same teacher at seed time and harvest. As it is now, with the school year beginning in August, the newly appointed teacher cannot organize a good Fair for September. In most cases, she knows nothing of preparations on the part of the previous teacher; and, therefore, concludes that "next year we'll have an exhibition." Of course "next year" she is gone, and a new teacher repeats the performance.

With the present arrangement of the school year, the only alternative is to hold the exhibition in June. We have advocated this for four or five years; and in a few sections it has been carried out. Thus the exhibition becomes the public examination. At this time the year's school work can be exhibited; but the garden work is lacking. Some teachers have advocated two exhibitions—one in June and one in September. This will work so long as new activities keep up enthusiasm. There is danger, however, of both teacher and pupils tiring of such work.

Whichever solution is adopted the exhibitions must become more educative. A few vegetables and flowers hastily gathered together; a little sewing snatched from the work-basket; a few rough boards nailed together and called "woodwork;" business forms and crayola drawings copied from the teacher's model on the blackboard; these, however well they may look at an exhibition, mean nothing more than hard work for the teacher and a few cents in prize money for the children.

Until the regular school notebooks, health charts, and daily records of the year's work are displayed at the end of the year, the exhibition will not be complete. Nor are these, in addition to the

ordinary farm and household products, sufficient. Vegetable exhibits should be accompanied by statements explaining their growth and selection. The pupil should also display literature which he studied or consulted for garden information. Charts and maps showing correlation between gard ening and regular school work are well worth while. Judges, or others competent to do so, might give short talks to the children on selecting prize materials.

Results of experiments are particularly desirable. These may include exhibits showing the results of different fertilizers, seed selection, land drainage; milk records on different food rations; etc. Here would come, too, new *varieties* of potatoes, dahlias, or gladioli grown from *seeds*. Comparatively few children know how new varieties of our vegetables, flowers, and fruits are obtained. They will frequently tell us that such is the result of grafting which, of course, is not true.

The best kept garden plot in each school section should receive local recognition. School parades, pageants, games, contests and sports should be heartily encouraged. Public-speaking Contests, or Judging Competitions, are particularly desirable; or a debate on some farm topic.

Local Exhibitions are valuable because all residents can attend. District Exhibitions are desirable, however, because they help standardize the local fairs. Teachers should accompany their children to the district exhibition, and take charge of them throughout the day. It is a school exercise—not a holiday.

If School Exhibitions should follow the educative suggestions here outlined, the larger exhibitions conducted by the grown-ups of the future will be much moi e worth while than they now are. At such time the Fakir's Row will not be the center of attraction.

These are not merely theoretical suggestions. Everthing here advocated as a desirable part of an exhibition has been tried out. About 400 schools in Nova Scotia each year exhibit the products of their industry. No one exhibition has had every feature as outlined; but the collective exhibits of the province have included everything suggested in this paper. In isolated cases desirable features have been carried out in addition to those named; but as these had only local significance, they have not been listed.

In the hands of a good teacher, the exhibition has greater educative possibilities than any other school function. In fact it is absolutely necessary if we are to take advantage of the child's natural desire to "*do* something."

Garden Work in Congested Cities

By Joseph S. Taylor,
District Superintendent, New York City

Let it be understood at the outset that I speak not as one "having already attained, either were already perfect." I am somewhat in the position of the clergyman who was reproved by one of his parishioners for some irregularity of conduct. "Well brother," replied the pastor, "I believe in division of labor: I preach and you practice."

The district in New York over which I preside, so far as opportunities for garden work are concerned, is a desert extending from Forty-second Street to the Battery. It includes Wall Street, the richest thoroughfare in the world, and a population consisting largely of poor foreigners coming from all lands and living in wretched tenements. Some of my twenty-six school buildings are modern, but about a dozen of them are of the vintage of 1850 or thereabout, and are hemmed in by tall tenements, factories, or warehouses. We have two or three excellent school gardens, and almost every one of my one thousand teachers has some green thing growing in the classroom window. But we are far from doing all that could be done even in a desert.

"I have a suspicion," says John Burroughs, "that nature-study as now followed in schools—or shall I say in colleges?—this classroom peeping and prying into the mechanism of life, dissecting, probing, tabulating, void of free observation, and shut away from the open air—would have cured me of my love of nature. For love is the main thing, and to train the eye and ear and acquaint one with the spirit of the great out-of-doors, rather than a lot of facts about nature is, or should be, the object of nature-study."

I agree with John Burroughs that love of nature is one of the prime benefits of nature-study. If that is not the outcome of the study I should call it a failure. The city-bred boy seems to distrust living creatures on general principles and to regard all alike as his natural enemies and lawful prey. His first query is, "What will he do to you?" His first impulse is to kill. It is the survival of an instinct that once was useful. Our remote ancestors were surrounded by dangerous animals which had to be killed

for food and for protection. The joy of studying the ways of living things, of appreciating nature as it is, of loving life because God made it and because it is kin to ours, seems to be rare among boys. Froebel was right when he insisted that children should be taught to cultivate flowers, but not to pluck them; to nourish and preserve life, but not to take it.

The first thing we have to do is to root out this killing mania among children. It seems to be due to a mixture of fear, cruelty, and thoughtlessness. Whatever it be, love of nature is the antidote. I have seen a boy carrying snakes in his pocket and making pets of toads and frogs. That is the way I should have all children feel toward nature. I canvassed a class recently to find out how many boys killed things last summer. Every boy had killed something. Some had caught fish, some had shot birds, or squirrels, most of them had killed flies, mosquitoes, or cockroaches. I have seen boys tearing the legs from living frogs with no more sense of cruelty than if thay had crushed a piece of inanimate rock. I believe it is the duty of teachers to destroy this lust for blood. My visit to the slaughter-houses of Kansas City and Chicago almost turned me into a vegetarian; for I shudder yet, after an interval of twenty years, when I recall the horrible scenes I witnessed there. I would teach my boy to be kind to animals; to admire flowers and shrubs in the city parks but not to pluck and destroy them.

Gardening has an important apperceptive value. The city child lives in a very artificial environment. All literature is full of figures of speech based on nature, and the school readers still assume experience with the barnyard and the farm.* Many of the adult city dwellers of this generation were reared in the country, and it is difficult for them to realize how inadequate is the back-ground of city-bred children for the interpretation of the books they read and the instruction they receive. This is what G. Stanley Hall means when he says that two weeks in the country will often give a child more real education than a term at school. Numerous studies have been made of children's comprehension of language, and all agree in the conclusion that the country

* Professor Daniel Starch has analyzed the material of ten school readers now in use in each of the eight grades. For the first three grades the average proportion of space devoted by these readers to animals is 20%, to plants 5.7%, to geography and travel 1.7%. This is a total of 27% of space devoted to subjects based upon experiences of country life. See *The Twentieth Yearbook*, Pt. II, National Society for the Study of Education.

child has a better knowledge of the content of words than the city child has. Thus in the Berlin test, repeated by Dr. Hall and Mr. Olsen, of Sweden, it was found that among children just entering school only 50% knew what a frog is, 35% knew a squirrel, 23% knew what dew is, 20% knew a lake and a plow, 11% knew a river. Of the city children only 18% had seen a sunrise, while of the country children 42% had seen one. Earl Barnes made a similar study in London, and discovered that the children of educated and well-to-do parents, who usually live in suburbs with gardens and rural surroundings, have a knowledge of words from two to fifteen times as great as that of children from the homes of laborers, artisans, and small shop keepers.

Gardening has also artistic value. I suspect that a child who has cultivated real flowers could hardly be content to fill a vase with artificial flowers. God made the country and man made the town. I should like children to feel about growing things as Little Nell did in Dicken's novel. "Her couch was dressed with here and there some winter berries and green leaves, gathered in a spot she had been used to favor." "When I die put near me something that has loved the light and had the blue sky above it always." These were her last words. Blessed is the child who can be happy with only the flowers or the sea or the field or the forest for companionship.

There is, thirdly, a social or practical value of nature-study. During the Great War we had a vivid reminder of the importance of knowing how to grow plants. The development of home gardens became an economic necessity. The school can therefore minister directly and effectively to the public welfare by teaching children to grow vegetables in the back yard. Millions of acres of productive land are lying idle near our large cities, while the citizens import food at extravagant prices from distant places.

Finally gardening has a *scientific* value. Nature is a great teacher when she really comes in contact with the pupil. In legal procedure only first-hand knowledge is admitted as testimony. The kind of knowledge that the public school has been giving to children about nature would be ruled out as incompetent testimony in any court of law; for it is second-hand information obtained by listening to a teacher who in turn got it out of a book. "Science is finding out and learning how." The important outcome of real

science teaching is not knowledge stored in the memory, but the habit of going to original sources for information, the ability to distinguish between essential and trivial fact, and willingness to follow the truth whithersoever it may lead. Many years ago an Austrian monk, working in his garden, discovered some interesting behavior in the plants he was breeding. He recorded his facts and conclusions in an obscure journal, and no one paid any attention to his record until years afterward. Now we speak glibly of *Mendel's Law*, and the work of this humble monk in his garden is the basis of most of the study of heredity by the men of science to-day.

In conclusion I shall quote a little poem by Annette Wynne on "Gold Hunting" to illustrate the feeling for nature which I would like to create in the hearts of city children.

The miser hurries through the town;
His head is bent, he wears a frown;
He hurries by through lane and street;
  He would make more gold to-day,
  Yet there is gold along the way
Growing at his very feet!

Dandelions round and gold—
All the dollars I can hold
Here are spread for me;
I shall pluck them—one, two, three!
Now I'm rich, what shall I buy?
Give me, Sir, a piece of sky
With the sunset shining through,
Gold or crimson, silver-blue;
Give me, Sir, a bird that sings,
Pulsing throat and busy wings,
And the other summer things.
  I shall buy a road that goes
  To a land where no one knows,
And a long, long summer day,
Full of sunshine, birds, and play.

Miser, miser, here's God's gold,
Gather some before you're old!

The Pleasure of Outdoor-Teaching

LUCILLE V. WILKINSON,
Washington D. C.

The statement is frequently made that out-door lessons are more difficult to give successfully than those of the regular classroom, which probably accounts for the lack of them on the regular school program. To enjoy them, first the teacher must set aside preconceived ideas of classroom discipline. To most classes the "unusualness" of being "let out" during school hours is a signal for a riot of joyousness that is somestimes difficult to get under control. Is this not a sad commentary on "school as she is taught?" A change to the out-of-doors should not be so unusual as to cause the air to "go to the head of the down-town child's head"as it were. "The child is father of the man." I stood on the outskirts of a tree lesson given at one of our higher institutions of learning last summer, and found the students, mostly teachers, conducting themselves in very much the same manner as eight grade pupils on its first expedition out-doors. That children do acquire the spirit of the lesson was clearly demonstrated last spring when our local Audubon Society co-operated with the nature-study corps in bird trips. Over a hundred boys and girls quietly crept along the streams and through underbrush to see the migrants. From the leaders came only enthusiastic reports of the youthful observers and from the children "When are we going again?" A fifth grade girl after a trip to the Zoo where she had been many times before without guidance, remarked "This is the nicest lesson I have ever had. I never had any one explain the animals to me before."

The distractions of the out-doors are naturally disconcerting to the teacher accustomed to the outward appearance of undivided attention that the schoolroom gives. It hurts, to take a class to the Zoo, for instance, for the study of the ruminants or the rodents, and find the interest of the children on the snakes in the cage across the room. The teacher's adaptability now comes into play. She strengthens herself by apparently following her class but accomplishing her own ends at the same time.

There are character revelations in out-door lessons. "You never know your children until you have been outdoors together." The quiet boy of the classroom may be most unmanageable while the inattentive and uninterested in arithmetic or grammar sometimes turns out to be most dependable in observation on a bird hunt. Why hasn't the outdoor boy a place in the scheme of the present day school? The schools should take a lesson from the success of the Scout and Campfire movements that have done such fine pioneer work in out-door teaching.

"Wee Wild Rose"

MILLIE RUTH TURNER
Butler, Penna.

Wee wild rose by the old gate gray,
I hear you calling me today,
I see your leaves gleam green and cool
Far from the heat of a city school.
Your pale pink petals are open wide,
The clover blooms on every side,
A bee flies by on lingering wing;
He loves you too, my wee wild thing.

Wee wild rose by the old gate gray,
I hear the breeze with your leaflets play
As I watch the children whose earnest eyes
Study the map where Egypt lies,
They cannot tell why it is I smile,
As we follow the flow of the River Nile;
Nor do they know that you haunt me so
As we search for the cities of long ago.

Wee wild rose by the old gate gray,
I would we might lay the lesson away
For the sake of children who never see
Rose or clover, bird or bee;
Close our books in an idle row,
And over the hills to the clover go,
Leave the map where the White Nile flows.
And follow the bee to the wee wild rose.

Egg-Shell Gardens in the Second Grade

REBA THOMPSON
Wilmington, Delaware

During the fall and winter much was said about seed babies and seed houses. The children gathered and brought to school as many different kinds as they could find. We talked about how Mother Nature nourished and cared for her little seed babies in their little cradles, and how, when it was time for them to find a new place to grow, she called all her willing helpers together to help her find a nice warm place for them to spend the cold winter until it would be time for them to grow. We learned that inside of all of these seeds there slept little baby plants and that just like all other babies, in order to grow these little babies must have something to eat and something to keep them warm. We wanted to watch some of these little babies grow, so we put the seeds in a nice warm place until spring.

We decided the best way to watch the seeds would be to have a garden in our room where we could watch them most of the time. On account of there being so many of us, we needed to have small gardens, so we decided to plant our gardens in egg shells.

Nearly every child wanted a garden all of his own, so he brought his own egg-shell from home—many of them brought as many as eight shells. We devoted a part of one afternoon to the planting and arranging of our gardens. We were going to put the egg-shells on the sandtable, so we filled the table with sand and moved it near a sunny window. We first punched a tiny hole in the bottom of our shells for drainage, and then put in the soil and carefully planted our seeds. After planting, each child gave his garden a good drink and placed it on the sandtable.

If children were ever interested in nature-study, they were certainly more than interested in the gardens. The first they thought about in the morning when they came into the room was their gardens. They wanted to see what had developed during the night. They watched them all day and cared for them as they would a very dear pet.

The gardens furnished numerous and interesting talks. Not only were they interesting for nature-study, but quite a few

interesting language lessons were developed from them. Some of the children who had several gardens allowed us to uncover the seeds in some of them to watch the development and from these we had quite a few excellent drawing and painting lessons. The little bean and corn plants were especially good for this.

This school is in a foreign district where most of the parents of the children have gardens in their own back yards, and as soon as these little plants had grown strong enough to be moved, the children took them home and planted them in their fathers' gardens, where they cared for them all summer.

Winter Sleep—A Kindergarten Lesson

AUGUSTA M. SWAN.
Washington D. C.

We know that the birds go down to the warm south-land when fall comes, and each day food is getting harder to find. But when Jack Frost comes with his cold wind and snow, when trees are bare, and the sky is gray, where are all the insects, or little bugs which we saw round us in the summer? We don't see them or hear them as we take a walk through the woods and fields in January.

Have they gone south with the birds? Oh, no! They are still with us in some shape or form waiting for the warm days of spring.

All we have to know is just where to look and then we may be able to find the babies of some insect mother, who carefully hid them away when the days began to get cold. Unless we look very carefully we shall not be able to see these babies because they are so tiny, so well hidden, and they don't look like their mothers at all.

There on a dry old goldenrod stem we see a little brown ball. It is tough though, if we try to pull it open, because inside the ball are baby spiders, sleeping and waiting for springtime.

Last fall, when we all started to school, the mother spider knew the cold weather was coming, so she made a warm strong nest, fastened it by threads of silk to a weed and then put her eggs inside. When spring comes the little spiders are ready to leave their nest.

Mother Grasshopper prepared for the cold weather too; but instead of hanging her eggs up in a ball, she made a deep hole in the ground, and then laid them there.

Covered over by autumn leaves, and later by snow these eggs are kept warm till springtime when they hatch and all the baby grasshoppers are ready to come up.

Under our feet also are the eggs of Mother Cricket, for like Mrs. Grasshopper, she laid them in the ground last fall, so that her babies might be safe and warm all winter. Tiny little things they are; we might never notice them, but in springtime when they hatch, and the baby crickets come up, we can see that they belong to the cricket faimily.

"Lady Bird, Lady Bird" flies away in the fall, and hides herself in some cosy place where she stays all winter, and then starts off to the bushes and plants to lay eggs.

Down in the soft mud of pools we find turtles, fish and frogs all waiting for the spring; no matter how the ice may cover the pond these creatures are not disturbed at all.

So you see some insects like the spiders put their babies in a cradle; some caterpillars wrap themselves up and hang on a tree so that

"When the wind blows,
The cradle will rock."

Other insect babies are waiting just below the ground, others behind the bark of trees, and some perhaps in our own homes if we could but find them.

Garden implements made by pupils
Brooklyn Botanic Garden

A Capital Idea from the Washington Schools

The financial guardian of the schools of the District of Columbia is the Congress of the United States. It has never been generous with its ward. The introduction of new ideas is difficult. To prove the worth of a new project, teachers have frequently raised money by private means. Proving its worth does not always mean that an appropriation will follow or that the growth of a movement will bring a needed increase in appropriation. This has been the history of school gardening and nature-study in the Washington schools. The appropriation for them requires earnest effort every year on the part of those interested. One would think that the wise heads of the nation would see the large return to the upkeep of nation's capital through the encouragement of such teaching in the schools. A definite effort last spring to show what could be done through the schools brought noticeable results in the appearance of the city but nothing more for the advancement of the work nor for putting on a permanent basis that which had already been accomplished. Our method of encouraging civic interest may be suggestive to others interested in that subject and who have little money to push it.

In the early spring, bunches of pussy willow were offered to Normal students as prizes for slogans that would carry the idea to children. The following were selected;

A Capital more beautiful,
Your job and mine.

A Capital Idea:
Washington the greatest garden in the world.

Make your Capital grow.
Invest in a Washington garden

Give your neighbor's grass a chance.

Respect your neighbor's grass and flowers.
You will then enjoy your own.

These were printed on placards by a colored high school class on paper furnished by the community center and hung in prominent places in every school in the city.

The responsibility for the project "A More Beautiful Washington" was assigned to the sixth grades throughout the school system. The nature-study teachers taught them the facts for making a lawn; keeping it in order; planning and planting both flowers and vegetable gardens. The children were directed to repeat these lessons to every class in their respective buildings beginning with the kindergarten children. The sixth grade teachers realizing the opportunity for practice in oral English most heartily co-operated in the preparation of the talks. Naturally the children were enthusiastic about taking the part of a teacher, especially to grades higher than their own. They plead for 100% clean playgrounds, lawns and streets. They emphasized the privilege that Washington children have through living at the capital and the return they could make to the rest of the nation by keeping it clean and beautiful for them when they visited it. At the close, they wrote concise reports of what the building had accomplished and sent them to one of the daily papers which published several hundred. One of these reports follows:

REPORT OF CLEAN-UP AND GARDENING BY THE KETCHAM SCHOOL. READ BY THE CHAIRMAN OF THE COMMITTEE IN ASSEMBLY.

You remember when the sixth grade told you to fix your lawns, flower and vegetable gardens. We afterwards asked you some questions to see if you really had tried to do what we had asked you to do. One of these questions was "How many of you have kept off of your own lawns?" Some of you haven't any lawns so this means to you, to keep off your neighbor's lawn and the school lawn. We also asked "How many had picked up rubbish?" This means not only in the schoolyard but in your own yard.

The sixth grade children gathered and tabulated these answers and I will now give you the results.

We find that 57% of us have gardens. 81% of us respect our neighbor's lawns proving that we are good citizens. I presume that the same people did not throw paper on the playgrounds as I find the percentage the same. There are seven-eights of us that kept off the school lawn. I presume that the other eighth are the ones that always give the teachers trouble on the outside. Five-eights of us have cleaned our lawns; probably the rest have no lawns to clean. Three-fifths of our good citizens have desired

to have clean surroundings as shown by picking up rubbish. The other two-fifths have seen nothing to pick up.

Only one-third has planted nasturtiums, our city flower. Are you going to help make it more popular?

Signed by the chairman of the committee,

ROBERT FASTNAUGHT

Their success in the grades caused them to look for greater opportunities. They asked the privilege of addressing the high school students at their assemblies. Fifteen hundred high school boys and girls listened to Katherine Simons, sixth grade, Wallach School, deliver the following advice, applauded her enthusiastically and later sent a report of their efforts;

Have you a backyard? Have you a front lawn? How do they look? Are you proud of them? Well, you ought to be.

A Capital More Beautiful.

Your job and mine.

It is a great thing to have a vision but it is much greater to make that vision a reality. That is what we must do. Washington more beautiful will be a fact when your yard and mine are gardens. You can be the Aladdin to rub the lamp and transform Washington into a city of lawns. There is really no magic about it, an iron tooth rake, a bag of lime, a package of grass seed and a little work. You will be rewarded by a beautiful lawn.

Take your bag of lime; bend low and scatter until your yard is covered with a slight snowstorm. Take care that no wind is blowing, as this will carry it to your neighbors' lawn and while you want your neighbors' lawn to grow, you sprinkle lime on your own. Then rake! Perhaps you will think this a hard task but you will soon find it more fun then work. The lawn is now ready for seeding. Take a handful at a time and scatter from one end to the other. Walk back and do it all over again. You will then be sure your entire lawn is covered. It is now time for the birds to eat your seed if you give them a chance. Therefore roll your seed in. There are some people that do not seem to be able to read the sign, "Keep off the Grass." Our slogan is "Give your neighbors' grass a chance."

If you are thinking of having flowers, plant them in a border. This not only makes your yard attractive but helps to show off

your grass. Cut your own flowers and let your neighbor cut his. Come, let's find a way to make Washington beautiful.

The aim throughout was to inculcate respect for others' property and labor and to furnish pleasure to others by attractive surroundings. This is as clear in the accompanying second grade contribution as in the talk to the high school students.

Grass.

Listen to me children, I want a chance to grow.
I will help to make your city beautiful.

EDWARD G..... 2A Grade

"KEEP YOUR PARKS CLEAN"

In co-operation with the American Forestry Association a demonstration was given to the public that it is possible for 2,000 children to have their lunches in the open and leave the grounds sightly for those who follow. Of course this required some training beforehand but such training is what our nation needs. The unsightliness of public parks on Monday morning after the use of them by the general public on Sundays is general throughout. Pictures were taken of some of the most beautiful spots around Washington before the park force had removed Sunday papers and lunch boxes. One photographer counted 107 sheets of newspapers in Potomac Park. With such a basis we taught what should be done and did it. After our 2,000 children left Rock Creek Park, the superintendendent of the park reported that his force had no evidence of the presence of such a gathering but the well filled trash cans. One boy wrote to the secretary of the Forestry Association "If the children of other cities leave their picnic grounds as spick and span as we left ours, I am sure that the amount of forest fires in the United States will be greatly reduced" which is another angle to be considered, for instruction, that of leaving camp sites clean.

Washington children are being taught to take their share of responsibility in the upkeep of the Capital. Can you instruct your congressman to do his share by them? Give him a capital idea:

Washington's Schools Should Be Second To None.

Items From The Schoolroom
Garden Notes

A PRIZE WINNER.

During the summer I belonged to a canning club. I had to have my own garden of a tenth of an acre. I worked it myself and enjoyed it very much. I grew string beans, lima beans, peas, tomatoes, onions, peppers, beets, peanuts and cabbage. When the things were ready for use I canned them. I received the first prize at the exhibition in the fall. The prize was a trip to the University of Maryland at College Park. I had a grand time with a hundred others.

KATHERINE SWANN.

MY GARDEN

(This garden was visited by the associate editor of the REVIEW and was as fine as Clyde says it was. It covered one-tenth of an acre in a community garden and without question was the best.)

My garden was on the Anacostia flats. In it I grew some very fine and delicious vegetables. I grew some very fine radishes, beets, carrots, cucumbers, Sweet and Irish potatoes, a great lot of wax beans and string beans. I had forty-five poles of lima beans that gave enough to eat and can. I had tobacco and peanuts and very good luck with my two hundred tomato plants. I grew some very fine egg plants, green peppers, fine corn, spring onions and a nice bed of very fine parsley. I also had kale, nice spinach and a few turnips. I had a nice garden in 1921 and hope to have a better in 1922.

CLYDE PEZOLD, Van Buren School

LIME THE SOIL

Spring will soon be here and we shall have to get our gardens ready. Vegetables will not grow in sour soil. There is a way you can tell whether your soil is sour or sweet. Buy some blue litmus paper in a drug store. Put some of your soil in a pan. Put a piece of litmus in it and leave it for a time. If the litmus paper is still blue when you take it out your soil is sweet but if the paper

turns pink then you have sour soil. You will have to do something to your soil. Put some lime on it and leave it awhile. You are supposed to use a thousand pounds to an acre but if your garden is not quite as big as that you may use one pound to forty square feet.

HELEN WALL, Dent School

THE EARTHWORM GARDENER.

Long before men had learned to till the soil, there was a gardener hard at work preparing the soil for the future use of men. This gardener's name was earthworm. He was busy grinding the soil and making it fine so that it would hold the water that plants need in order to live. This gardener also added lime to make the soil rich. He made channels through which air and water could get into the soil. Another thing he did was to plant seeds which lay on top of the soil.

If all these things were added together we would see how much this little gardener has done for us.

LESTER BUCKLEY

A GARDEN HELPER.

One day I saw a toad sitting under a flower. I was about to chase him when he stuck his tongue out and caught a caterpillar, and ate it. After that I got some more toads and put them in different parts of the garden. In a few days I didn't see a caterpillar. After a while I noticed that toads ate flies and gnats, too. I think toads are very useful in killing insects. If everybody had toads in the garden there wouldn't be many insects.

CHARLES COOK, Wheatley School

BIRD STUDY CLASS, 1921

My entrance into the Audubon's Society Bird Study Class was entirely by accident; the mere X mark on a paper drawn from a hat.

We had three lessons and two hikes to get a certificate. I did all of them and found it very interesting. In the lessons we studied stuffed specimens, and had a grand review at the last. On the hikes a number of children went off together and rambled through the many paths in or around the Zoo, often seeing as many as fifty living specimens. When the classes were finished I felt I had acquired much information about our feathered friends and I hope I shall never forget it.

CANFIELD MARSH, Powell School

Bird Notes

Notes on a Young Robin Recorded by Oswald Schreiner, Chevy Chase School, D.C.

Bird was taken from its nest May 10, three days after hatching. Amount eaten.

May 10 A.M. Three pellets of bread soaked in milk, 4 worms in piece.
Noon. 16 worms.
P.M. 28 worms, three pellets of bread.

May 11 A.M. 12 worms, 4 pellets of bread.
Noon 16 worms
P.M. 12 worms

May 12 A.M. 8 worms
Noon 8 worms
P.M. 12 worms and two teaspoonfuls of hash

May 13 A.M. 8 worms and 4 mouthfuls of hash.
Noon Teaspoonful of hash
P.M. Teaspoonful of hash

May 14 A.M. Teaspoonful of hash
Noon Teaspoonful of hash
P.M. Teaspoonful of hash

May 15 A.M. Teaspoonful of hash
Noon 10 worms
P.M. 14 worms

May 16 A.M. Teaspoonful of hash
Noon 10 worms
P.M. 14 worms.

May 17 A.M. 10 worms .
Noon 14 worms
P.M. 15 worms.

May 18 Today he learned to eat worms picked up by himself so a further record is impossible. He enjoyed the cicadas and lived on them for a week. He learned to fly on the thirteenth; not much but a little. He took his first bath on the twentieth. He became more or less wild soon after and left.

Feeding boxes, The one at the left screened to protect suet meant for small birds

The woodpecker likes a long deep hole with thick sides so he ca chisel; seen at the left

Bird houses, some made of camouflaged tin cans and some are bark covered.
Courtesy of U. S. Forest Service

Our Exhibit of Bird Houses

The boys in our seventh grade are urged to make bird houses in the manual training shops, for two reasons: to encourage birds for their economic value and to prevent boys from robbing nests for it is hardly possible that a boy would destroy his pets.

Notwithstanding that the children had been given directions as to the kind of houses birds preferred, the exhibit in January showed that many children think birds have the same standards of judging homes that people have. There were houses that no bird would live in, such as double houses, bungalows, colonial mansions and cabins. Then there were the houses that received blue ribbons from the American Forestry Association because they followed specifications.

Here are some of the facts that were given them to follow. Houses should not be so large that birds would be lost in them. The hole must be high from the floor so that the twigs will not cover it as the bird builds. There should be some way to clean the house, movable roof, bottom or sides. Houses should not be gaily painted but camouflaged with bark or brown paint. Birds love disguised tin cans. Wrens like their houses 4″ by 4″ and 6″ deep. The hole should be the size of a quarter, five inches from the floor. The bluebird likes a house that is 5″ by 5″ by 8″ with a hole an inch and a half in diameter. The wood-pecker is a carpenter by trade so there should be some work left for him to do. He likes a long deep hole with thick sides so he can chisel some more.

Each house was a thought for protecting birds and in our exhibit there were 1,104 such thoughts.

Josephine Bloodgood, Wilson Normal School

A Few Observations On Insects.

One day a boy friend of mine caught a praying mantis while picking wild flowers. Gordon put his pet into a glass and covered with a net. Each day we had the job of catching flies for its meals. After we had several we put them into the crystal cage and watched it enjoy them. Folding its forefeet as if in prayer

it would peep through one of its popping eyes and suddenly jump upon one of the unlucky flies. It would tear it to pieces saving the wings to the last. One day Gordon let it go as he thought it would catch more of our enemies if it were loose and I have no doubt that it would. FRANCES DUKE, Force School

One night I was at a friend's house playing games when we heard something batting at the screen. When we opened it a big Cynthia moth flew in. When I left for home it was perched on the mantel fanning its wings.

The next morning when I called for Claudia there were eggs all over the apartment, clinging to the door, on the mantle, on the table, on the floor, the window sills, the victrola, the bookcase and the desk. Her aunt would not let them stay for she said she was not going to have worms crawling all over the house. I wish that they could have hatched. JANE LYNN

Mr. Robin

JOHN LECKEY,
Morgan School, Seventh Grade

Were I a bird it seems to me
Some way that I would rather be
A Robin.
In springtime when all life is gay,
I'd flit and sing the livelong day,
For life is sweet in merry May
To Mr. Robin.

My nest I'd build in an apple tree
Close by a boy I often see,
Were I a Robin.
For all the birds he loves to make
His friends, and gentle care he'll take,
Of me and mine for love's sweet sake,
Were I a Robin.

And then, you surely ought to see,
How Mr. Farmer's friend I'd be,
Were I a Robin.

The worms and bugs and things you see,
That spoil his vines and kill his tree,
Oh, Boy! How good they'd taste to me,
Were I a Robin.

The Spring

Springtime is here
The weather is clear
And the birds are singing their songs.
Soon we shall see
The wasp and the bee
Busy the whole day long.

The trees putting forth
Their little green leaves
Are glad for the sunshine and rain.
The crocus that peeps
From its dark winter's sleep
Sings Hurrah! for the Springtime again.

JACK EMERINS. B Grade, Wilson Normal

Nature-Study Projects in the Sierra Summer School

WINIFRED PERRY
San Diego, California.

For some time I have felt that a very excellent approach to much of our school work is thru nature-study. Thus when the opportunity came to me last year to supervise the Project School, the training school of the Fresno Teachers' college which holds its summer sessions at Huntington Lake in the high Sierra, I gladly accepted.

The children were divided into four groups as follows; first and second, third and fourth, fifth and sixth, seventh and eighth. The first group worked out a mountain camp as a project. The next group had a food project. The fifth and sixth groups enjoyed their study of water and the oldest group was vitally interested in a forestry project.

The interpretation of the term "project" is still an undecided issue in many minds and many consider this method of presentation of school subjects a fad. After six week's experience with project teaching I can safely say that the twelve or more practice teach-

ers went away feeling that this is not only a safe and sane method, but one which brings unusual results as well.

The term project has been used in referring to the building of a bird house, the planting of a garden, etc. But as it was used in this little school, and rightly I think, it had a much broader meaning. Everything that was brought to the attention of those children during the daily three hour session for the six weeks had to do with foods, water, or forestry. Some will call it a scheme of close correlation and such it is. It is obvious that in a training school where several teachers are handling one group the material taught must be considered to a certain extent at least, as reading, writing and arithmetic. But the most advanced form of project work forgets the various subjects of the standardized curriculum and teaches forestry as an end in itself. To be sure in such a method a goodly amount of arithmetic, language, spelling and reading will be used, but the concious aim of the teacher is not to invent a scheme of correlation or notivation but teach foods, water, forestry or what ever the given project may be.

Space will not allow a description of each project, but a discussion of the forestry project will illustrate the procedure. There could not be a more delightful place in which to consider forestry and its problems than in the forests of the Sierra The little school itself was in the heart of the woods. Jeffrey pines, sugar pines, red and white firs were at our very door. In the vicinity were Junipers, cedars, white pines, silver pines, lodge-pole pines, California black oaks and the quivering aspens. The interest in forestry did not have to be developed. These boys and girls were eager to learn in their favorite class-room under the pines with a rock for a desk or table.

Because there are some who do not yet understand that all of the traditional subjects of the curriculum find a place in a project I have separated the material taught by the three teachers and grouped it under nature-study, geography, arithmetic, language, and reading.

Nature-study was obviously touched by all three teachers every day. The different trees of the region were identified and some sketching was attempted. Then a tree was studied to learn its method of growth and functions of its various parts. Simple experiments in photosynthesis and transpiration and absorption

by roots were hailed with delight. The production of resin and turpentine was investigated. Temperature and the two types of thermometers, Fahrenheit and Centigrade, were explained. Birds were identified and discussed in their relation to the forests, as were insects. The flowers of the woods were identified.

Under the caption of language and reading the following were used: Enos Mills' "The Story of a Thousand Year Pine," Harold W. Fairbank's "Conservation Reader," portions of "Evangeline" and Joyce Kilmer's poem "Trees." There was a fascinating hour when a forest ranger, who had spent several years in the Yosemite, told of his duties and efforts to avert what might have been serious fires. Then there was much interest in the writing and production of a little play stressing forest conservation and the danger of fires. The very excellent teacher in charge of these activities summed up her work in the following aims: I. To arouse interest in nature, especially trees. 2. To create enthusiasm for the conservation of our national resources. 3. To encourage originality of thought. 4. To train children to express themselves clearly, both on oral and written work. In this group a minimum of written work was demanded. Children of this age haven't a great experience out of which they may write, but whenever there was written work it was required to be in good form.

In arithmetic the problems were of a practical nature and grew out of real situations. A visit was made to a sawmill on the mountain side. Here the various piles of lumber were counted and the board feet calculated. The cost of constructing a cabin of the type found on the normal grounds was estimated. Then while enthusiasm was high the boys of the class commenced to build a log cabin. Various problems in ratio and proportion were worked out. The height of the named trees on the grounds was found by their shadows. The volume of the college water tank was ascertained. There was not a problem given which did not come within the interest and experience of those children.

In geography the aim was to teach climatic factors as affecting the distribution of plants and animals and was confined to California. The weather received much attention. Rainfall, temperature, winds and clouds were discussed. The mountain ranges and deserts were located. The various valleys and their products

were noted. The resources and industries of the state were not forgotten.

Thus every hour of every day nature-study was being taught. Project works permits more attention given to nature-study than do other methods. But as project work and nature-study grow the special teacher or nature-study supervisor may be relegated to a very small place, for every teacher will have to do her own teaching as it may fit in with the project in hand and not wait for the too seldom visits of the supervisor.

A Wild Flower Show
Nature-Study Project, Time—3 weeks.

MARGARET GRACE NELSON
Montclair State Normal School, Pupil Teacher, Grade 6 A, Watchung School, Montclair, N. J.

Introduction

Why should we study wild plants?

1. When we know the names of the plants we are more likely to recognize them.

2. We come to appreciate nature as we understand more about our wild plants.

Educational Value to the Child

1. Awakens a vital interest in nature and the beauty of the great outdoors.

2. Child becomes acquainted with from twenty to forty wild plants.

3. Helps fit the child for real life situations as he proposes plans, and executes his plans in the Wild Flower Show; then judges of his accomplishment.

4. Children receive guests, explain the wild flowers, tell about the entries to both guests and other grades of the school—social training.

5. Children have a natural situation which requires them to write a friendly letter and an informal invitation.

6. Utilizes the study of drawing—the making of the posters by the Advertising Committee.

Teacher's Aims

1. To awaken a real interest in nature study.

2. To have pupils learn the names of a goodly number of the common wild plants and be able to recognize at least twenty of those studied.

3. To teach ways in which weeds are harmful and ways in which weeds are of value.

Pupil's Aims

1. To learn the names of the flowers and grasses studied.
2. To give a wild flower show—thereby sharing their work with other grades of the school, and guests.
3. To destroy harmful weeds about their own homes and gardens.

Subject-Matter

A. *Wild Plants to be Studied.*

1. Asters
   a. Heath
   b. Wood
   c. Purple
   d. New York
2. Queen Anne's Lace
3. Yarrow
4. Self-heal
5. White Snake root
6. Silver-rod
7. Golden-rods
   a. Rough
   b. Purple-stemmed
   c. Fragrant
8. Gentian
   a. Closed
   b. Fringed
9. Butter and Eggs
10. Purple Gerardia
11. Monkey Flower
12. Jewel Weed
13. Turtle Head
14. Chicory
15. Evening Primrose
16. Wild Lettuce
17. Milkweed
18. Bladder Campion
19. Boneset
20. Pink Knotweed
21. Artichoke
22. Black-eyed Susan
23. Red Clover
24. Thistle
    a. Common
    b. Sow
25. Dandelion
26. Field Daisy
27. False Solomon's Seal
28. Ladies' Tresses
29. Ironweed
30. Everlasting
31. Wild Cress Plant
32. Mint
33. Shepherd's Purse
34. Plantain
    a. Broad-leaved
    b. Narrow-leaved
35. Burdock
36. Ragweed
37. Bur Marigold
38. Grasses
    a. Fox-tail
    b. Crab
    c. Tickle
39. Cocklebur

B. *Ways in which Wild Plants are of Value*

1. They hold soil in place.
2. They are pretty to look at.
3. They cover up undesirable places.
4. They give back "humus" to the soil as a fertilizer.

C. *Ways in which Wild Plants are Harmful*

1. They crowd out cultivated plants.
2. They give untidy appearance.
3. They discourage farmers and gardeners.
4. They are poisonous to human beings and animals.
5. They spoil dairy products—(case of wild garlic)
6. They spoil the seeds of the crops.

Detailed Work

Lesson I.

a. Introduction by the teacher who brings to class a few wild flowers.

b. Get first aim from pupils for studying the wild plants.

c. Teacher gets pupils interested by telling the names of the wild plants she brings to the class.

Lesson II.

a. Review names of the same plants in Lesson I with the pupils, adding a few new ones.

b. Encourage the children to bring in others.

Lesson III.

a. Place plants in labeled bottles, adding any new ones brought in by the class—so that they may study them.

b. Get second pupils' aim—to give a Wild Flower Show.

Lesson IV—V—VI.

a. Test the class on any ten wild plants out of those studied.

b. Discussion and planning of the Wild Flower Show.

Lesson VII

a. Pupils to write letters to the judges.

b. Further study of wild flowers.

c. Ten more varieties labeled for study.

Lesson VIII

a. Test on ten new wild plants.

b. Drill on mistakes made in the letter writing.

Lesson IX

a. Ten minutes drill on ten more wild plants.

Lesson X.

a. Committee selects the best letter of those written to one of the friends.

b. Committee also selects the best letter of those written to the other friend. These letters are re-copied and mailed by the children themselves. Answers from these friends are received by these children and read to the class.

Lesson XI

a. Test on third ten wild plants. Pupils aim to get 100%.

b. Ten new plants introduced and studied.

Lesson XII.

a. Invitations to be written to the parents. Test on fourth ten of wild plants.

Lesson XIII

a. Invitations corrected and rewritten on writing paper.

b. The boy writing the best of these letters writes to the principal of the school.

c. The girl writing the best of these letters writes to the superintendent of schools.

Lesson XIV

a. Summary of the study of wild plants by a dicussion of the ways in which they are harmful and of value.

Lesson XV

a. Editorial on The Value and Harm of Our Common Weeds. The best article to be used in the class newspaper.

b. Class judgment of their Wild Flower Show.

The teachers should get these suggestions from the pupils:

(Teacher may aid)

1. There should be a manager and several committees to take charge of the flower show.
2. Only those receiving 100% on three of the four tests will be eligible to serve on a committee.
3. The manager will be elected from among those receiving the highest averages on the four tests.
4. There will be three contests, two of which any pupil may enter.

Contests:

I. Bouquet containing the greatest number of wild flowers.

II. Bouquet which is the most beautiful in color and arrangement.

III. Rarest flower or flowers found in this vicinity.

5. Prizes.

A first and a second prize will be awarded in each of the contests.

The first prize will consist of a blue ribbon badge.

The second prize will consist of a red ribbon badge.

6. Every member of the class will donate a penny toward the prizes.

7. There will be five judges. Three of the judges will be pupils of the class.

The other two judges will be friends outside of the school.

8. The committees will be as follows:

I. Receiving Committee.

Duties.

To receive parents, judges and classes of the school at the Wild Flower Show.

This Committee will have three members.

II. Arrangement Committee.

Duties.

To prepare the room for the Flower Show.

To keep a list of those who enter the contests.

To make any rules they think necessary concerning the entries.

This committee will consist of five members.

III. Advertising Committee.

Duties.

To make posters advertising the Flower Show to the school.

To assist the arrangement committee if necessary.

This committee will consist of three members.

IV. Committee of Judges.

Duties

To act as Judges in determining the winners in each contest.

This committee will consist of five members. Three members of the class and two outside friends of the school.

9. A friendly letter will be written to two outside friends by the class inviting them to act as judges. (Let one half class write to one of the friends and the other half write to the other friend).
10. Invitations will be written to the parents.
(Instead of each child writing to his own parent it will make for greater interest if slips are drawn from a hat and the child writes to the parent whose name appears on that slip).
11. Invitations will be written to the principal of the school and to the superintendent of the schools of the city.
12. Each child will make a catalog in which he will write the names of the flowers and wild plants studied.

A Robin Orphanage

By Mary Wecka
Student in Harris Teachers' College, St. Louis, Missouri

As soon as the robins occupied the old nest on the sycamore tree in front of our house I fetched my spyglass and kept it at hand to watch the private concerns of the robin family, as I do each year. But I did not dream that this year my observation would end as it did.

On the eighteenth of April, two eggs were laid; one early in the morning, and one later in the day. (Last year the first egg in this same nest was laid on the twenty-third of April.) On the nineteenth, the third egg was laid, and on the twentieth the fourth and last. On the afternoon of the same day the female began to brood. We had a heavy shower that afternoon and to see that bird sitting patiently on the nest while the rain was pouring down, made one feel,—I don't know,—but I think if many could see it, they would perhaps be the better for it. But that has nothing to do with my story.

As I knew that it ought to take about two weeks for the eggs to hatch, on May the third at seven o'clock in the morning I took my spyglass and hied to the attic. Lo and behold!—there were four robins in the nest. They had been hatched probably during the night. The most prominent part of each robin, the wide-open mouth, was well above the level of the nest. The female robin was

standing up much excited. Then she flew away. Later I saw the male robin bringing food to the nest.

I turned the lookout duty over to a member of the family and went to school. That evening I was informed that the mother robin had not been near the nest all day. I saw the male make two trips to the nest before it was too dark for observation. Next morning as I was leaving for school, I saw the male on a branch near the nest. He flew away shortly afterwards and as I learned later, did not return during the day. The hungry robins cried so loud that they could be heard thru the open window. I made up my mind to take care of them.

As the nest is about twenty feet from the ground and the tree has comparatively few branches, I thought climbing would be an acrobatic feat. In a short time, however, and with not so much trouble, I was on the ground again with four wee robins in a case strapped to my back. The old nest was left in the tree in hopes that if the parents should return, they might stay. I put the baby robins in an Easter basket lined with flannel. This basket was kept near a window between the kitchen and the dining-room.

The problem now was to keep the robins well fed. This was not very difficult at first. By the time the birds were settled in their new home, the news had spread to all the small folk in the neighborhood. I extended an invitation to the little people to come and see the robins and made them realize that the birds should not be handled or frightened in any way. Everybody was so immensely interested that an expedition set out at once to look for worms. Sixty-five worms were brought in, that day; not a worm was left that night. Discovery of the robin's voraciousness shocked everybody, and some of the children began to feel great concern about how we should ever manage to keep the little birds from starving; for they would open their mouths so wide that pieces of worm disappeared as into an immense yellow chasm. And the robins, like all babies, were sure to let you know when they were hungry. Every morning promptly at four o'clock, they began to call for something to eat. One practical member of the family remarked that the robins would make an excellent alarm clock, if they did not ring too early.

Just as I was beginning to multiply sixty-five by fourteen, and to think that even that would not be a sufficient number of worms for a two weeks' supply, a happy idea came to me. Why not give the birds the yolk of a hard-boiled egg? I tried this and it worked well. After the birds swallowed the yolk, I dropped some water down their throats by means of an old eye-dropper. The robins seemed to thrive on this so that from this time only an occasional worm was given them. Also strawberries were not scorned; and once I fed them on mashed potatoes, but on the whole, I tried to keep their diet as true to robin nature as I could.

The robins had plenty of admirers. When the basket was being cleaned, I let the children hold the birds for a few moments. I believe it does a person good to hold a robin, or a frog, or a bunch of flowers, or a garter snake in his hands. And as the children held the robins, and remarked about their speckled breasts, they learned that a very very long time ago, the ancestors of the robins all had speckled breasts when they were full grown, but now only the baby robins have speckled breasts, which disappear when they grow up. The children also discovered just how many toes a robin has and why it is easy for him to get worms. Many guesses were made as to what became of the parents, and the children waxed sympathetic as they conjectured the fate of the old birds.

As days went by, more feathers grew on my foster children. At the end of the twelfth day, I noticed an unusual amount of stretching in the basket. The robins perhaps were beginning to feel that the chief aim in life is not to sit in a basket and be fed. Just fourteen days after I took them from the nest, I heard the robins fluttering in the covered basket. I knew that the time had come to let them go. I was loath to part with them, however, and kept them in the covered basket until next morning. Then on the seventeenth day of May, I took the basket out into the yard and lifting the cover let the robins go. They flew as though they had been flying for years.

The children of the neighborhood are still very much interested, and every time they see a young robin, they think that perhaps it is one of "our robins."

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THE
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The Summer Camp and Nature-Study

WILLIAM GOULD VINAL

Rhode Island College of Education

Paper given at the Annual Meeting of the American Nature-Study Society, Toronto, Canada, Thursday, December, 29, 1921.

In 1920 the National Association of the Directors of Girls Camps voted to hold a Nature Training School for nature councilors. This school has been through two successful sessions and is now thought of as a permanent institution.

It is a significant thing that the course has been termed NATURE-LORE rather than NATURE-STUDY. The words study, teacher, class, lessons, etc. are tabooed in camp. Not that study is less—it is deeper. The aims of camp cannot be discounted because of this change in vocabulary. It is a challenge for the teacher to investigate the WHY of the change.

Nature-lore is possibly the goal but hardly ever the realization of Nature-study. Both are organized nature-learning. Just as Nature-study is not Elementary Science,—so too, Nature-lore is not Nature-study. The point of attack and the results can never be the same, until the schools have their camps and their opportunities of forest recreation. Detailed comparisons will be given to show the present differences in method and what we may expect as results.

NATURE-STUDY	NATURE-LORE
1. Nature-study is mainly aquaria, cages, flower-pots, and pictures in the schoolroom.	*1. Nature-lore is mainly swimming, fishing, foraging, and photographing out-of-doors.*
For example: In perch study the fish is placed in an aquarium in the school room. Questions to direct the observation of the pupil are written on the board, such as: What is the shape? Describe the tail fin. What is the color along the side? How does this help him? Compare with the picture of the fish from Japan. Perch study in New York City or Toronto is the same. Since it is a schoolroom lesson all the pupils are doing the same thing at the same time. One must either fish or be a "clam"—there is no other opportunity. The project method may alleviate the situation but how many teachers are there who can use this method successfully in nature-study in a graded room with the hurly-burly of a modern curriculum. Most so-called project lessons are old lessons made over with more attractive bait.	For example: In the camp dining hall announcement is made that we are going to Gull Pond. Those who want to go fishing may meet "A.B." on the beach to get bait. As this part of Cape Cod is sandy there are no earthworms except in a few gardens. The bait is, therefore, sandfleas. Right from the beginning perch-lore differs from perch-study. By 9 a. m. the whole camp is "en route," a four mile hike o'er hill and dune. Unlike the school one may fish or not. Those who fish acquire real knowledge of perch. Others may pick blueberries for the flapjacks or have a shampoo in the lake. In any case one can not be busy around Gull Pond without learning much of nature even though that be not the aim of the expedition. In the group are enthusiastic leaders, chosen because they believe in their work, big sisters but not one "teacher," so-called.
2. Nature-study is mainly studying living things or about living things.	*2. Nature-lore is mainly living with living things.*
For example: A Nature-study lesson on the red squirrel means a live animal in the cage, a stuffed specimen or a picture. Let us choose the best conditions—a live animal. The pupil stands off to one side and observes. The questions may bring out a few isolated facts. Other questions require reading: Has it cheek pouches? When are the young born? Describe the front teeth These answers are artificially produced. The pupil now has generalized statements about red squirrels which are true anywhere.	For example: Last summer a pair of red squirrels took possession of the mail box in the pines. Some of the Campers became too enthusiastic in peeking at the "cute" little fellows and the squirrels had a moving day. The mother squirrel carried each wee baby by the nape of the neck to a safer height—a bird house in the top of a pitch pine. The campers looked on in breathless suspense—a nature-lore lesson without words. The observers had been partners in the group. They had had an ex-

The knowledge is pigeonholed with other daily collections from History, Grammar, etc. More interesting than these? Yes, but pigeonholed nature-knowledge is not what we want.

3. Nature-study is mainly an outer urge. The *teacher* says: Next week we will *study* the frog. Who *will* catch one for me? *I* will put a list of questions on the board which *I* want you to answer. You may *have to* read some of the library books on frogs in order to find some of the answers. *Do not* remove the wire screen as the frog may get away. *I* will put this sign "Please give me a fly!" on the side of the jar so that you will not forget to feed it. Such a lesson is full of devices and persuasions. It is a teacher-made plan.

3. Nature-lore is mainly an inner urge. The camper says: Why can we not catch a frog and watch it swim? The swimming councilor has previously told them that the frog does the breast stroke perfectly However this was not bait for a lesson on frogs. They discovered that the frog executed his strokes so rapidly that they couldn't see how he did it. A toad was then suggested. Soon some one wished to see the circulation in the foot and finally the inner organs. Only those staid who wanted to see the dissection. In fact those who thought that they might squeal or have hysteria were asked to go away.

Knowledge sought by the pupil is more lasting. It is a self-assigned learning and is carried to a purposeful conclusion by the initiative of the learner.

4. Nature-study in the traditional school is individualized.

By a traditional school is meant the formal, arbitrary school that has been in vogue since the colonial Dame School. 90% of our nature-study lessons are taught on this plan. The criticism is of the *method* of nature-study rather than of nature-study. The procedure is as follows: Tomorrow, John will bring his cat to school. For thirty minutes each one of us will think about the cat. For one or two minutes each one will be thinking,—what is the advan-

4. Nature-lore in the summer Camp and a few schools is socialized.

The summer camp is a small democracy. Its life is one of spontaneity,—free but orderly. If John is fishing there is no class to fold their hands and watch him. One may fish or not as he chooses. If someone else decides to prepare the fish for dinner all well and good. There is team work but not class work. Someone remembers having rolled a fish in clay and baking it. Volunteers want to hunt for clay. Others like the fish broiled. A

perience with a living animal under a natural setting. Not learned all about red squirrels? No, for a nature-lore lesson is never complete, but possibly a keener enjoyment and one to be remembered longer.

tage of the cat having retractile claws? While Mary is trying to find how many toes the cat has on its front foot the others may be Wondering what Mary is going to say. Helen may give the cat some milk. (Probably all need to stretch their muscles by now.) And so it goes for the assigned time. There is no doubt in the mind of the visitor as to which person is the teacher. As to the pupils—they are all worker bees cramped in the same kind of a cell.

competition is started in the preparation of fish,—others join the game. Professor Palmer has described in detail many socialized nature activities in his Cornell leaflets. Many such games arise impromptu. Every member of the hive is like the queen bee with plenty of room and food for growth. The period of growth is not arbitrarily put down as thirty minutes, or at 10 a. m. or for the last week in January in the third grade. There is doubt in the mind of the visitor as to which one is the leader. And to the life of the camper has been added another of those never to be forgotten experiences.

5. Nature-study is something that is taught.

In this respect it is not unlike the three R's. The same dose is prescribed in all cases with absolutely no regard for the requirements. Yet nothing has been suggested in the nature-lore method that could not be applied in the school. Peter Bell never went to school in the woods as did Thoreau. Peter Bell went to the three R's every day. And he went into a nature-study class. And when he came out he thought that a primrose was a primrose. How could he think otherwise? If there was nothing contagious how could he catch anything? And who is taking Peter Bell, and your boy and my boy to the woods as we were taken?

5. Nature-lore is something that is caught.

This audience is supposedly interested in nature. You were born naturalists. Everyone is a born naturalist but is usually killed as a naturalist before he is ten. You escaped the killing-off process. Right here I wish to ask a personal question: Was your early interest for nature kindled in the four walls of a school room or did you catch the enthusiasm outside? I have my mother to thank for the song of the robin in the old "high-top" tree. And one of the greatest days of my life was when Dad took me "bobbing eels." A nature-study lesson could never take the place of these experiences. These experiences are nature-lore.

6. Nature-study starts and stops with a bell.

Arithmetic is arithmetic no matter whether the bluebird flies South or the bluebird flies North, and arithmetic it must be.

6. Nature-lore comes at anytime.

It is not scheduled and may not be planned. It may happen on the way to breakfast or during a mid-day rest. It may interrupt a baseball game or it may tip over a canoe.

7. Who are the graduates of the Nature-study School? One time I took a large party of nature-study students on a carefully planned outing. When we arrived several came up and wanted to know how long they had to stay. They did not see any fun in a wood-frolic They wanted to get back to the "Movies." You too may have had disappointments in the lack of interest in the nature which you appreciate so well. My experience is that the nature student hardly ever gathers what may be called momentum in nature appreciation or accumulative enthusiasm.

7. Who are the graduates of the Nature-lore School?

All country boys and girls. All pioneers. It was the school of Lincoln, John Muir, Thoreau, Burroughs, Enos Mills, and Dallas Lore Sharpe. It was the school of every one who has a woodsy spot where he loves to return. The place where he feels peculiarly at home. The locality that he can write best about in his letters. It is the sea captain who longs for another trip; it is the old man who dreams of a "bare foot boy with cheeks of tan;" it is the mountaineer who returns to his West Virginia Home.

What Can We Expect From Nature-Lore Experiences?

There are many evidences that the summer camp is not the only institution which expects results from nature experiences. In Detroit the public schools have been placed on an eleven month system, so that all the children of all the people may go to an organized camp. For the business firm we may mention the General Electric Company which maintains a camp for employees during vacations. Leaders in Social Settlement Work and Community Centers, missionaries and preachers, are seeking the why and how of nature recreation. Along with the attempt to develop the music resources of our communities is coming the idea of recreation in nature. Vacations can no longer be vacancies. What are we doing to meet the situation?

It is stated that 20,000,000 people in this country attend the motion picture show daily. They pay $4,000,000 at 18,000 theatres. This means that one-fifth of our population have the "movie mania." The moving picture man has a means of amusement (not synonymous with recreation) which he has sold for a good price. We have a better proposition which we have not been able to give away. The Sunday supplement is equally popular. We must reorganize. Now is an opportune time to place our wares on the market. Nature-lore gives experiences for the individual or for the group. It gives another wholesome opportunity for spending leisure time.

The nature-lore student finally accumulates a wealth of nature experiences. These nature experiences are the materials out of which a structure is built. This structure is nature's laws. Out of the laws comes an appreciation of nature, and appreciation which may be termed *a local nature-patriotism.* And local nature-patriotism must precede *national nature conservation.* Without this appreciation in our people any attempt to develop the conservation of our natural resources is destined to failure. And with all this can we not sing "I love thy rocks and rills" with a new fervor.

Camp Nature Ideas in the Classroom

MARGARET M. CORNELL

North Shore County Day School, Winnetka, Ill.

"And a little child shall lead them."

How frequently we hear the following expression, "Oh, that is easy to teach when you have your pupils in a camp; but, impossible in the classroom. The very lack of the out-of-doors makes the work artificial and the child does not take the same interest."

Now *is* this really so?

Is not the child always responsive to the natural phenomena around him? Does not the innermost part of him cry out for companionship with the birds, plants and animals which are such an integral part of his very childhood? Once set him wondering and his education has begun. The mental processes are quickened, the powers of observation become keener and his sense of brotherhood takes on a new meaning.

Whether this development comes from a summer spent among the whispering pines, by a quiet lake, in a mountain camp, or in the classroom, the greatest factor,—and the one of most vital interest—is that he sees the thing as it really is!

Bring the great out-of-doors to him. Any classroom may be converted into a camp. The difference is not one of environment, so much as of atmosphere. It is not a teacher he needs; it is a "comrade-in-arms." A leader who has the spirit of a child in himself, regardless of years; whose love for the pulsing animation about

him will lead him to anticipate the wants of the child and to interpret those wants naturally and freely.

It is this comradeship with the children, this observing of the phenomena as they actually occur and the attendant informal discussions that make nature-lore at camps so vital. It is the lack of this informality and the failure to provide the pupil with the same outdoor stimuli that has produced such direful results in the classroom.

How may such freedom be brought about in the room, you ask.

Donate a corner of the room to pets; swing a bird cage in a sunny window; make a baby world from a discarded bowl; build an aquarium and step by step furnish it; hang the walls with pictures that paint the rainbow tints of setting sun and rising moon; surround him with books wherein he may read for himself the Indian myths and poems of our great land.

At once the whole atmosphere of the room changes. The throbbing world has come to him. Twitching fingers find work to do; straying eyes open upon new worlds and sluggish brains become active. Turn the child free to learn from observation as we do at camp. There will be no question of discipline. That takes care of itself, for there is neither time nor inclination "to loaf" with active, constructive projects to develop.

Let him construct the home for his guinea-pig, rabbit or doves, and learn of trees, their uses and characteristics. The walk home will take on new interest, and a trip to the park will be followed by questions without number, questions about trees, that correctly answered, will instill in him a knowledge of their use in industry and our dependence upon them, as well as lasting reverence for the native trees of our land and as keen an appreciation of those towers of living green as Joyce Kilmer had when he wrote:

"A tree that looks at God all day
And lifts her leafy arms to pray."

Give him a sand table in the south window. It will reveal wonders to the child who has had no opportunity to follow the blazed trail, to watch the lengthening shadows or see the sun sink behind a mountain. Then let him construct a sundial, and use it. Latitude, longitude, time and direction become mere factors neccessary to the development of his project. Geography is no longer an ordeal, but a pulsing reality— a correlation with all mankind.

He takes keen interest in modeling the various physical regions that are determining features in man's progress; in filling the valleys with water and peopling his mimic world.

Show him the infinite possibilities of the aquarium. Few teachers realize the immense amount of material for nature-study found therein. It has all the fascinations of lake and stream. The sand and pebbles unlock the door to the history of minerals; the clams and snails, not only are typical of the lower forms of animal life, but, teach the great lesson that Nature has a purpose for all things, whether high or low in the stage of development.

When a child remarks, after watching a clam at work, "Why, he is a live vacuum-cleaner, and the snail is a scrub-woman," you know that child has a knowledge more precious than gold. He will spend hours watching the mother snail deposit her coral-colored eggs in a pear-shaped cluster just above the water level, or in observing the tadpole's legs puncture the skin. And his questions will be vital and of the greatest importance to him at that period of his life.

If he asks, "What is that green stuff on the side of the glass?" introduce him to a new kind of fairyland. Place some on a slide and let him see the algae through a microscope. With him, trace the different stages of plant life in a baby world.

Such a world may be constructed with a glass confectioner's bowl having a glass cover. On the bottom, place some soil, and some common moss. Plant in this moss, dwarf ferns, club moss, partridge berries, rattle-snake plantain, vines, or any woodland plants; then add a tiny newt or toad, cover and set in a partially shaded spot. The child soon sees for himself how vapor, rain and frost are formed, how plants reproduce and why insects are necessary.

As the spores drop to the ground and new growths begin, or the tiny partridge blossoms gradually lose their petals and assume the form of berries red as the blood of life, he will learn the same lessons the child at camp learns.

Then encourage him to bring in any natural object that challenges his observation. With him learn its secrets and from the specimen pass to the world of which it is a part. Introduce him to the naturalists of America. Through the stories and pictures of such men as Thoreau, Enos Mills, Audubon, Agassiz and

Burroughs acquaint him with the fern growths of the south, the wild fruits of the mountain sides, the pines of New England, the coal-beds of Pennsylvania, the gorgeous panorama of the Grand Canyon. Make him feel that these are his to enjoy and understand.

Thus may a close, personal contact with living organisms in the classroom cause him, in a simple, natural way to have a kindred feeling with the great out-of-doors. Such an understanding and sympathy cannot fail to produce broader manhood and nobler womanhood in the years to come.

Eight or Nine Words About Nature-Study

ELEAZER JOHNSON DOLE

The Tall Pines Camp, Bennington, New Hampshire

To be more explicit, there are two. The first one is "why;" the second, "how." Not the "why" of the desirability of nature in summer camps, for every teacher and camp director knows that. Not the "how" of the best teaching of nature, for the writer freely confesses that he doesn't know that. But rather why is nature not as attractive as we sometimes wish it were, and how may we make it appeal to a larger numberof camp girls? We shall not discuss the shortcomings of the nature teacher, for we live in a glass house. Every good teacher will recognize that he has certain faults, that he has made certain errors in the past which he himself must rectify. Suggestions from others may help. For such words of wisdom he is respectfully referred to those who are qualified to give them. We are not.

That there are certain difficulties in making the nature lesson attractive to all is generally admitted. Granting that the nature leader has his problems and that not all of his pupils will respond to his efforts as he wishes them to, we may be inclined to condemn the teacher when the real trouble lies elsewhere. In spite of the comparatively short history of the institution of summer camps, it seems that there have grown up with them certain traditions, and we may be hampered with the heritage of the past without realizing it. The writer believes in being conservative. His system of philosophy tells him that it is the teacher's duty, but

some of the things which this paper discusses have been in his mind so long that he can scarcely be accused of radicalism if he ventures to give them expression. Yet he does not pretend anything new. We've heard it all before, but some of us need to be reminded occasionally of what we are already supposed to know.

In the first place the girls are on their vacations, and anything even remotely suggesting school rightly meets with their disapproval. In our efforts to give them as much as possible I fear that we sometimes lose sight of this fact. The girls come to camp to play and they find waiting for them a formidable array of nature teachers, nature books, nature periods and nature study with all the paraphernalia of a well organized school, all anxious to help them have a good time. Courses in nature are now given in many public and private schools, and it may be that the poor child has some very unpleasant memories of her previous experiences with nature (such things sometimes happen,) and she probably at once decides that she won't do nature work unless it is required. The psychological effect is decidedly bad.

We have to compete too with other camp activities which have a greater appeal for most girls. These are the various forms of athletic and aquatic sports. Normal girls prefer to work with their hands rather than their heads, and things which they can learn to do by doing them such as tennis, swimming, handwork, and riding are much more attractive to the average girl. The girl in camp should be a healthy young animal and little else. The nature teacher faces a real problem when he attempts to make his subject as interesting as some other camp activities. Game and group activities in which there is the element of competition also appeal to some and here again we have to meet competition.

Such are some of the reasons why nature-study is so frequently a disappointment to the management, a bore to the girls, and a bugbear to the teacher. Perhaps we can never hope to have the girls leave a swimming lesson for nature, although last summer some of the writer's girls when asked to choose, hesitated for a moment, but for a moment only. They always decided in favor of the swimming. We all agree that the nature lesson must be informal. The writer believes that we should also drop the school terminology and adopt some other system of nomenclature. Such names will readily suggest themselves to the leaders. Dr. Vinal has made some good

suggestions about combining nature with games. The writer's experience has been that the nature was too prominent a feature of the game.

Last summer we combined nature with hiking and believe that our results were unusually satisfactory, if the amount of interest manifested is a criterion. The space allotted to us will not permit a detailed statement of just how it was done. The leader was the hiking councillor and his work was supplementary to that of the regular nature teachers. We found that in order to maintain the maximum amount of interest it was not advisable to take a party of more than ten. Except for the very smallest girls, the hikes were long enough so that the tramp through the woods rather than the nature stood out in the girls' minds as the important part of the day's program. The leader had his campaign carefully mapped out. He said nothing about nature until someone remarked about a dead tree by the side of the path along which he had purposely guided them, or perhaps it was a big boulder which had been split by the frost. These opened up an almost limitless field for conversation. If the girls didn't see the tree and if the boulder made no impression on them, all we had to do was to ask in which direction Camp lay. A line of fingers pointing to every part of the horizon was the answer, and this was our opportunity to begin with the use of the compass, or the ways of finding one's way without a compass.

Something novel was always interesting. Blazing trails, following an unknown path and exploring bogs added to the variety and gave us a wonderful opportunity of seeing nature in her most intimate mood. Not only did we have a goodly amount of interest, but we believe too that the girls carried away with them pleasant memories of the hikes. The next time they go in the woods we hope they will see more than they did before, perhaps the dead tree by the side of the path or the boulder which had been split by the frost.

What would have become of you if it had pleased Providence to make the weather unchangeable?

—SYDNEY SMITH

Gypsies

CHARLOTTE V. GULICK

Director of the Luther Gulick Camps

Those of us who love nature dread to furnish any kind of bait to induce others to enter into this love. It seems to belittle the thing which we know is interesting enough in itself. It hurts us to offer an incentive for learning the most wonderful secrets of nature. Yet there seems to exist a certain hesitancy among many young people, especially in the summer time, to give themselves to anything that seems to mean work, or concentration.

In last year's NATURE-STUDY REVIEW an article was published about the nature work at our camps. That article was written by me two years ago. We have had two more years of camp experience since then and have established a new set of land honor ranks namely, Little Gypsies, Gypsies, and Gypsy Queens.

The results of these new ranks are most gratifying. You may not be able to recognize the list of honors given below next year, for we are always adding to and substracting from the requirements and privileges attending all of our activities. The point is to keep them alive and interesting. The ranks given previously were superimposed while the Gypsy ranks were worked out more or less by the girls themselves.

We have only one Gypsy Queen and hers is an honorary degree as we have not yet worked out the requirements and privileges for this rank.

The weekly initiation to the various ranks is interesting and quite thrilling when the Little Gypsies are allowed to partake of the Gypsy brew and are given blue bandannas with the privileges of the comradship of the open road. They enter a new world.

REQUIREMENTS FOR LITTLE GYPSY

Honors

Camp Craft

Walk 40 miles. Frye's Leap 5 miles, Raymond 10 miles, Quaker Ridge 10 miles, South Casco 5 miles or other walks as permission may be given.

Sleep out over night, rolling poncho correctly, making shelter of two ponchos and not talking to anyone from last bugle at night to first in the morning.

Make fire and cook supper for at least six people out of doors. This can be done on Tuesday night or on a trip and when cooking for fifteen or more people three can work together.

Make nature toy for child.
Plan and make a woodsy costume. This can be done on a trip for a stunt or in camp at any time.

Horse

Harness and unharness properly and drive well enough to be trusted with Pal alone. Be able to care for a horse over night and groom a horse at least four times.

Nature

20 birds, 15 trees, 10 ferns, 20 flowers and 10 insects. Kill 50 gypsy caterpillars or get the pupae.

Farm work

Put in eight hours of good work, not less than the full period at a time.

Privilege

The ride to South Casco on Saturday either on horseback or if the road test has not been passed, in the farm wagon.

A gypsy trip.

Requirements For Becoming a Gypsy

Honors

Camp Craft

Sleep out three successive nights.
Forage for supper one night. May get food in the woods

or in the garden or buy provisions from a farmer, not from stores.
Make fire in wet woods.
Cook with two others a successful meal on a gypsy trip, cooking other dishes than those cooked for Little Gypsy.
Cook in hole in the ground or in a reflecting oven.
Know the principles of first aid.
Decorate Sivad.

Nature

Walk 75 miles. (If done the same summer with Little Gypsy same miles may be counted.)

Clouds, stars, etc. (Miss Cornell)

Horse

Pass the first test in horseback riding.
Take a horse down to be shod or its equivalent.

Farm

Transplant at least 20 plants successfully. If there are none to be transplanted in the garden, find wild plants and place them with the consent of Hiiteni in some place to decorate the camp.

Privilege

Overnight horseback trip.

George Borrow once asked of an old gipsy whom he found living by himself in a lonely hovel on the moor what pleasure he found in life; the aged man answered:

"Life is sweet, brother! There's day and night, brother! both sweet things; sun, moon and stars, brother! all sweet things. There is likewise a wind on the heath."

Canoeing and Nature-Study

By John B. May, M.D.,

Director, The Winnetaska Canoeing Camps, Ashland, New Hamspshire.

"Thus the Birch Canoe was builded
And the forest's life was in it;
All its mystery and its magic,
All the lightness of the birch-tree,
All the toughness of the cedar,
All the larch's supple sinews;
And it floated on the river
Like a yellow leaf in Autumn,
Like a yellow water-lily."

Hiawatha.

The Indian originated the canoe, that he might creep up silently upon his prey, the timid deer drinking from the stream, the wild goose feeding in the shallows, or the salmon in search of its spawning ground. The sportsman has developed the canoe for his more modern hunting and fishing, making it more seaworthy and more serviceable. And the thousands of boys and girls who annually visit the organized camps of our Vacation Land, find in the canoe the ideal vehicle for much of their nature-study, as well as their sport.

All life requires water in greater or less amount. Insects, reptiles, birds, or mammals, are found in greatest abundance near water, vegetation grows rankest near it, and it goes without saying that fishes cannot be found away from it. While the bare and rocky mountain top, the shifting sand dunes, and even the desert have much of interest for the nature student, it is along our ponds and streams and swamps that we find the greatest variety of interesting things.

The advantages of the canoe are many and obvious. There are no noisy oarlocks to frighten the birds and drown out their songs, no rudder to foul at the critical moment as you work your way among the lily pads, no flapping great sail sticking up above

the bushes, no racketing engine to fuss with. The canoeist is always looking ahead, not straining over his shoulder, his paddle slips through the water without a sound and with hardly a ripple, he can navigate narrow inlets and shallow coves where any other craft would go aground, and he can force his way into swamps where no other method of travel is feasible because of the depth of black muck. He can almost float on the dew on the grass.

Of course the canoe has its limitations, but all true campers should know and understand them. You can not jump around in a seventy pound canoe as you would in a three hundred pound dory. But neither can you jump around anywhere and expect to learn the secrets of the home life of our timid birds and beasts. If you can't control yourself, stick to botany and geology! The birds won't like you.

Nature-study from a canoe presupposes that you can swim, can paddle and steer, and that you will use the only sensible paddling position, that of *kneeling* in the canoe instead of sitting cocked up on the seats. (There are two excellent reasons for this position, safety and efficiency, but there is no room here to discuss the essentials of paddling.)

Now let's take a little trip and see what we can see. There are three of us and I'll take the helm. The others can take other canoes and steer their own courses, for you mustn't have too many on a trip of this kind. At first we will all three paddle, but later I'll work the canoe alone while you two "stop, look, listen." As we launch the canoe a spotted sandpiper bows to us, calls "peetweet" and circles low across the water to light a hundred yards below. In the shallows a few brown newts or "salamanders" scurry away and from a sunken log a big hornpout swings out belligerently from his swarm of tiny black baby pouts. Punkinheads or sunfish are guarding their nests on the yellow sand, and a little farther along shore we see the larger, pebbly circles of the bass. A loon calls from the middle of the lake and we swing our bow off shore to watch its wonderful diving. A tiny baby loon is with its mother and we paddle out until we are near enough to see the silvery coating of air bubbles clinging to its black down as the little fellow dives and tries to escape us. It can only stay down a few seconds while its mother can stay under water for three minutes at a time.

Now we leave the lake and enter the narrow stream which forms the outlet. Lay aside your paddles and be ready with bird glasses and note books, while I paddle "Indian style," not taking the blade of my paddle from the water. A king fisher "winds up his reel" angrily and flies down the waterway between the trees ahead of us. Swallows are darting back and forth in numbers, hawking for mosquitoes, a service which we should appreciate. Glossy tree swallows are carrying food to their young in the woodpecker's hole in the dead willow, dull colored bank swallows skim low over the water, and barn swallows and eave swallows twitter incessantly. A few big purple martins are down from the colony at a nearby farm, and if we are very lucky we may catch a glimpse of the pair of rough-winged swallows whose nest I found one year on this Ashland River, the only breeding record of the birds in the entire State. If so, we will have seen all the species of New England swallows in one small area.

Many of the taller trees along the river have been killed by the water backing up from the sawmill dam, and their dead tops furnish observatories for a dozen different species of birds. Scores of waxwings are flycatching from them, as well as kingbirds, chebecs, wood pewees, redstarts, and vireos. We hear a few woodpeckers drumming and are on the alert for a possible glimpse of the big pileated woodpecker whose work we often see in the woods. In the lower growth, the alders and maples and tupelos, several different kinds of bright-hued warblers are hunting, and we see nests of kingbirds, yellowbirds, and a catbird. In a tussock of coarse grass a redwing has woven his basket of grasses, and we paddle over to watch the young birds. All is quiet in the nest for a time. Now touch the edge very lightly with a finger tip, as a returning bird might touch it in alighting. Presto! Every blind and sleeping baby has suddenly waked, the yellow bills have popped open and we seem to be looking at a bowl of small orange tulips, as we gaze into the wide spread mouths. Insert a fingertip into one of the mouths and feel the effort to swallow made by the nestling!

We worm our way up a narrow tributary brook, the birches meeting over our heads. On both sides song sparrows and swamp sparrows are singing, and we hear the loud call of the northern waterthrush. A phoebe calls persistently from the bridge rail, and as

we pass beneath the road his mate flies from her moss-covered, feather-lined, mud house on one of the log stringers. Near the bridge we land to watch a chickadee feeding her eight bob-tailed little Blackcaps in a hollow birch stub.

At the edge of a wet meadow we see a great blue heron hunting frogs. Watch the deliberate way in which he slowly lifts one foot, sets it down gently in the mud ahead of him, leans forward, lifts the other foot, places it carefully, and then, with an almost lightning-like motion, darts his long neck forward and spears his prey. For a second he holds the frog as he looks around, then begins the work of swallowing. And what a job it is! The long neck craned upward, we watch a strange swelling pass slowly down from the bird's beak, until it reaches the body, and the bird settles down for another period of watchful waiting. But now we pick up our paddles and drive the canoe forward with a few quick strokes toward the unsuspecting heron. In a panic he springs up, the great wings flapping awkwardly, the neck craned ahead until he is well clear of the trees, then folding back in an S-shape so that the head rests between the shoulders, the bird makes off down stream. Some day we will paddle up the big lake and visit the heronry where a dozen nests are located in dead trees in a big swamp, and where the black ducks nest, and possibly a pair of the beautiful wood ducks, a spot only to be reached by canoe.

Over here at the edge of this little backwater, are some plants of the round-leafed sundew. Shall we stop and help it to a meal, for the sundew, like the pitcherplant, is said to be carnivorous? Catch one of those tiny lace-winged flies, and touch it lightly to the sticky filaments which fringe the sundew's leaf. Isn't it uncanny, the way the leaf curls up about the insect, until it is hidden from view? By and by the leaf will uncurl again and only a shriveled shell will be left for our fly. See how many other shells of dead insects we can find on the other leaves.

There at the edge of the stream where the woods come close is a belated moccasin flower. A bee buzzes past us, lights on the inflated pouch, forces his way rudely in through the incurved edges and we watch his shadow through the translucent blossom as he takes his fill of nectar. Now he is finished, and is crowding out from the upper part of the petal, with a load of yellow pollen plastered on his back, for this bee is the instrument of cross-

fertilization of the moccasin, and his work is to carry the pollen to another flower, so that the seeds may set and more plants beautify our woodlands.

But this pollen is not to fulfil its mission. As we watch the bee starting low across the water, a green frog squatting on the bank is watching too, and there is a sudden spring, a splash, and the bee has disappeared down Mr. Frog's wide mouth. The frog continues swimming across the pool towards a fallen log, and as he passes near the lily pads, a powerful swirl stirs the water, and a good-sized pickerel darts out and Mr. Frog has disappeared in turn. Before the pickerel has had time to return to his sheltering pads, it may be that a big osprey, wheeling overhead, will spy him and dropping like a shot, grasp him in his long hooked talons, or a slim mink, slipping into the water like a shadow, will come up underneath the unsuspecting fish and carry it off to its snarling little ones in the den nearby.

But even when there are no comedies or tragedies to watch, there is always something to see which makes the trip worthwhile; the blue sky overhead with a few white clouds, the heaven-kissing hills in the background, the winding river valley with its terraces hinting of their fascinating story of glacial times and ages of erosion, and close at hand graceful white birches outlined against towering pines, with an occasional touch of scarlet or orange where a swamp maple, turning prematurely, is reflected in the quiet stream. And when at last the sun drops down behind the distant mountains, the clouds are changing to rose and flame, the veeries and the hermit thrushes are fluting in the dark woods and the whitethroats whistling from the edge of the blueberry pasture, it is time for us to silently turn our canoe upstream and steer our homeward course.

RICHES

I looked into the lily-bell to see what lay within,
To find how deep the chalice was, what nectar pearled therein.
The bottoms of lily-cups with olden treasure in
Have hung upon the thoroughways wherever I have been.

L. H. Bailey, in *Wind and Weather*

Nature-Study at Quanset, 1921

Mrs. E. A. W. Hammatt,

Camp Quanset, Cape Cod

Fresh wild flowers, each in its own receptacle, and each named with the scientific and common name were kept in the camp assembly hall. The leaves of our common trees and shrubs were preserved in the same way. Campers were eager to add to the collection.

The eight or nine small tables of girls were often divided into two bands (some name always suggests itself for each party). Each follows a trail leading back to camp, one going east, the other west. At supper after the meal is finished, the tables name their specimens; the honor goes to the group finding and naming the larger number. Sometimes flowers, or leaves of trees or shrubs are given out to the tables after supper to see which table has the honor of naming the most.

This sort of thing cultivates the seeing eye, but does it develop a real love of nature? It seems more like a mad scramble for the *most*, a "*grabbing*," as it were. It is really not the "getting" that we want most. It is the watching, the seeing, the learning to draw an inference—the loving it all and getting a glimpse of its inner meaning—that is of the greatest value to the young in the study of nature.

On the long stretch of smooth sand dunes on Nauset Beach, across the bay, Quanset girls often watch the maze of footprints, big, or tiny leading in and out among the sparse tufts of beach grass, or over open spaces. This leads them to study the little wild things of the dune and their search for food. Here a field mouse scampered about looking for his breakfast. There a skunk rooted for bugs, and again he sat on his haunches and devoured his find. And here are bird tracks. What bird, and what did he find?

On their own beach they find a clay bed, and they wonder (and they learn) how it came there. A well striated and polished boulder too is found on their own beach. They learn what smoothed and scratched it, and how it came there. The "cut" is a low

place in the bar or barrier beach formerly the outlet of Pleasant Bay, where in bad storms the waters break through. Here a line of old telegraph poles below high water half covered with the sands of the beach tells its own story of the washing away by the winds and waves of the sand bluff. At the Nauset Life Saving Station is a steep bluff. The storms of the winter before had laid bare in the bluff an ancient peat bed. In it are preserved the old tree trunks that helped to form it. Beetles wings, brought to light in the peat beds, crumble to dust when the air strikes them. They hear that valuable specimens of the "hind wing" have been found in the Harwich woods. They plan to go out and sugar for moths.

Under the soil of the greater part of the continents and even of the ocean floor, bed rock is found. But under the glacial soil of Cape Cod, no such bed rock has been discovered, either in exposed cliffs or in deep well borings.

"The cape" then, has no backbone of rock. But how did it get here?

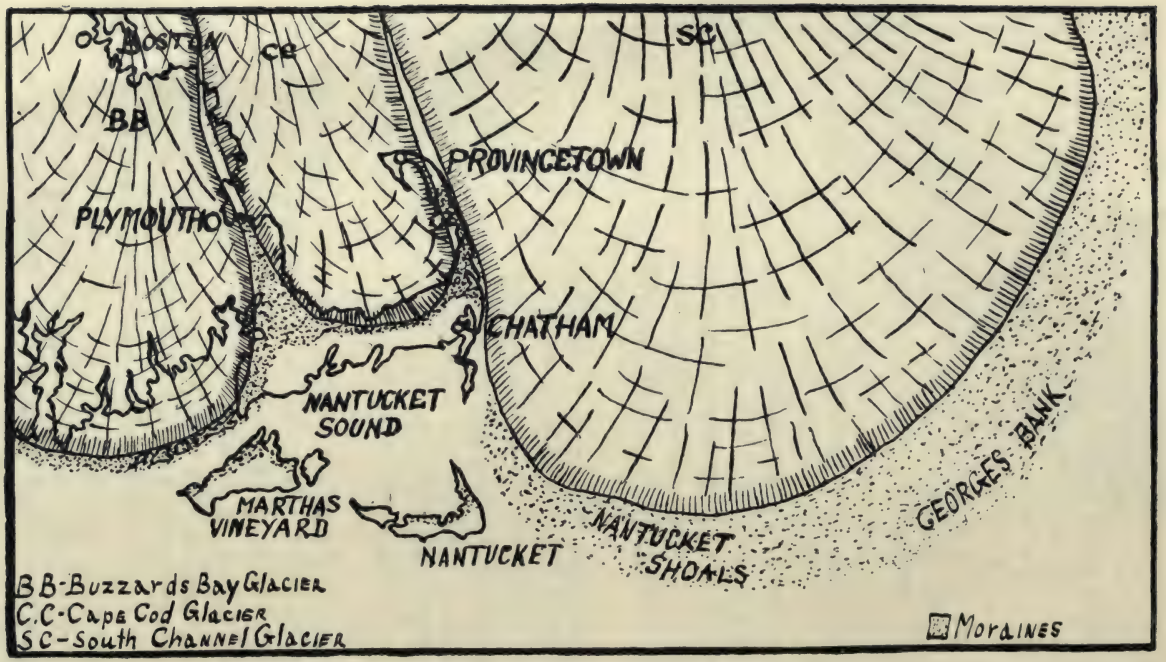
Geologists explain its presence something as follows.

Once on a time (geologic time), when ice sheets covered great parts of our country and ground their way slowly but surely down from the frozen north, south and southeasterly over New England, there were three such glaciers hereabouts. One filled Cape Cod Bay, one filled Buzzard's bay and spread toward the west, while the third, a hugh one, stretched way out into the ocean to the east of Cape Cod.

As the Cape Cod glacier pushed its way slowly south, it scooped out the sea floor to make the bay and, as its edge melted, there slid and dropped from it, here an immense mass of gravel and boulders, there a huge heap of sand, clay and rocks. This shows as a *mixture* of coarse and fine material not seen where it has been sorted by water. In the latter case the coarser material is dropped first, and the finest of all is kept longest in suspension. Water sorted material is stratified, the lines or strata plainly visible.

Glacial boulders may be seen on the tops of the hills and elsewhere on the Cape. Enos' Rock or Enoch's Rock is a well known example.

All this material dropped by the glacier, it had collected in Labrador, or Vermont or Massachusetts (we can tell by the kind



GLACIAL MAP OF CAPE COD REGION

Plate from "Cape Cod and Old Colony" by Albert Perry Brigham. Use of plate authorized by G. P. Putnams Sons, Publishers.

of rock found, from which ridges or mountains it was broken. It had swept this drift along in its current as rivers sweep along tree trunks and other wreckage in their rush to the sea.

And thus came the "tumbled hills" of Plymouth and the bay shore, simply sliding and tumbling from the edge of the Cape Cod glacier as it melted. They are called glacial moraine, and because they come from the end of the glacier, they are called terminal moraine.

The extreme reach south of the Cape Cod glacier is supposed to have been Nantucket, Martha's Vineyard and Block Island, where evidence is found of terminal moraine. In the Elizabeth Islands, Southern Rhode Island and Long Island are terminal moraines from the western glacier.

Meanwhile, on the west, was dropped the lateral (side) moraine. Wherever the two glaciers flowed side by side we find the interlobate moraine, or the moraine between the lobes of the two glaciers. And since the Buzzard's Bay glacier melted first, that from the Cape Cod Bay side "spilled over" to the west and formed the valley at Bourne through which the canal has been dug.

As the Cape Cod Bay glacier melted, huge blocks of ice, still covered by earth and rocks, broke off here and there. In time the ice melted from beneath, making ice-block holes or "kettle holes." Later on the surface waters made lakes and ponds of many of these. These lakes have no outlet and need none, for the water seeps away into the loose porous glacial soil.

There are several kettle hole ponds and swamps and very many dry kettle holes near camp. Cliff Pond is a kettle hole.

The irregularity of the glacial deposit cuts off drainage and causes fresh water swamps. Thus it has aided in the establishment of cranberry culture.

With the melting of the ice, sands, clays and gravels washed out from beneath the Cape Cod glacier (sorted on the way) were spread out into a great outwash plain. This covers the whole south shore of Cape Cod from Falmouth through Chatham and slopes gradually toward the sound. Over this plain meandered streams of glacial waters to the shore of the sound, excavating shallow channels, now valleys. Into some of these the sea has since made its way and has formed tidal runs or salt rivers so called, while others are swampy.

From the big eastern glacier, after the melting of the Cape Cod glacier, streams flowed westward to the bay, and thus made many parallel east and west valleys, seen all the way from Orleans through Truro. Jeremiah's Gutter in Orleans is one of these. This nearly made the upper end of the Cape an island in earlier times.

Nantucket Shoal and St. George's Shoals off towards the east are believed to be moraine deposited from this big glacier.

After the glacial period, the tides, winds and currents swept up the sand of the cape north of Truro, and made sand spits and barrier beaches. Off Nauset the tide as it drives in divides, part flowing north and piling up the sand there at the end of the cape, part flowing south, washing off the cliffs and spreading out the sand in the barrier beach that encloses Pleasant Bay. In some places barrier beaches were washed up so as to enclose the outlet of a salt river or bay, changing it gradually to fresh water, or again the barrier enclosing fresh or kettle hole ponds was washed away in a November gale whereupon the salt water rushed in.

Salt meadows have filled in on the inner tide of a barrier beach, strengthening it against the havoc wrought by wind and tide, and literally making land.

At Truro and on Pleasant Bay shores and at Nauset Head Cliffs are blue clay beds, over them water sorted sands, and under them ancient consolidated gravel beds, all laid down by glaciers earlier than those mentioned, or by the waters of geologic periods coming between two glacial epochs.

Geologists warn us that in a few thousand or million years Cape Cod will be washed away by Atlantic storms unless we build an enormous and expensive breakwater to protect it. The interesting thing is that Cape Cod is still land in the making.

Woodcraft Councils, held in the deep woods, with the sky above the only outlook, were an interest in camp last summer. To secure coups, the naming of wild animals, birds, flowers, mushrooms, etc. is important. To know their habit and their habitat, to be able to take advantage of a knowledge of nature and depend on it for one's living in the woods, is still more important. And with all this, a knowledge of nature and a reverence for nature and nature's God go hand in hand. The ideals inculcated by Woodcraft are the best, the highest. One thing alone,—to teach young

people to make the thing needed out of the simple material at hand,—to live simply,—is very worth while in this age and country of materialism and conventionality.

Quanset will go on with the woodcraft, stressing the part of nature-study where it can encourage the real observation that is of value. Most of the girls love it. If presented to them in such a way as to show cause and effect, if evolution can be made clear, if they can be led to watch for the sake of seeing what is going to happen next, and to understand—not simply to name things—it will appeal to the thoughtfully inclined. It is not that we want to make a naturalist of every girl, but that we do not want her to lose the keen interest in nature which is inborn, we do not want to cut her off from the enjoyment in later life of the secrets of nature.

As the year previous, the short stay with us of the Dallas Lore Sharps proved an inspiration not to be forgotten.

A Modern Fairy Story

HENRY E. CHILDS

Technical High School, Providence, R. I.

THE FOREST OF OLD KATAHDIN

The seeds of many family trees were transplanted from Boston, Providence, Cleveland, New York, and even from far away Japan, Peru, and Cuba. With the utmost care they were planted in the glorious white pine grove by Forest Lake where stands the rustic shack loved by all Sons of Katahdin.

At home these seeds had been called "Myles, or Lester, George, or Chester; but here they became, "The Horrible Polack," "The Terrible Swede," "Tubber," and "The Caveman." When they learned to answer to these new names every seed was taught that he had a part to play in the great game of nature and that the more he learned about the life of the woods, the more powerful he would become and better able to care for himself while enjoying life in the heart of the Maine woods.

When such a seed had learned ten birds, had collected and could name twenty flowers, and could recognize five kinds of trees, he was announced to the world as a seedling. He had begun to grow.

A little later the seedlings learned the colors of more birds, could identify five just from the song, had learned more flowers, had collected ten fruits growing wild, had managed to stay on the trail of a bird for fifteen minutes, had learned the whys and wherefores of a flower's many parts, and had watched a family of birds at a nest for half an hour. By this time the youngster was becoming enthusiastic and reaching up toward the top of the forest. He became a sapling.

It was harder to grow into a tree and still harder to win the highest title of all, "The Big Tree." Fifty birds, a hundred flowers, the finding of a warbler's nest, five orchids, five mammals, a full report on the nesting habits of some bird, and the trapping and banding of five birds for U. S. Biological Survey were among the stunts.

A good deal of this nature-study was done on the camp grounds, or along the lake shore, in the swamps, woods, or upland pastures nearby. Several longer hikes and canoe trips were taken lasting three or four days and extending into the lake country and mountains in every direction. To cap them all, a glorious ten days jaunt into the wild portion of the Rnageleys right up to the Canadian line is offered for the best hikers.

As seedlings, saplings, and trees vied with one another for the honor of becoming a big tree, the boys came to appreciate more than ever before, the wonderful opportunities for enjoyment that nature offers to us.

Some people are always finding fault with nature for putting thorns on roses: I always thank her for putting roses on thorns.

—A. KARR

Nature-Study in Camp

FANNIE A. STEBBINS

Supervisor of Nature-Study in Public Schools,
Springfield, Mass.

The object of Nature-Study may be considered as fourfold in outlook:—economic, intellectual, esthetic and moral or spiritual. These may not be separated entirely, but sometimes one, sometimes another may be emphasized.

Under the economic phase would be classed any study which has mainly in view, either the fitting of man to his environment, or, the fitting of his environment to man and his needs.

This line of thought would lead, for example, in bird study, to finding whether a species were helpful or harmful to man.

If we watch a friendly little chickadee, see him pick off innumerable little specks from a twig to which he may be clinging, "upside down," collect some of said "specks," examine them under a lens, and decide that they are real insects, then learn that they have beaks, sharp enough and strong enough to pierce the bark of the tree and that their hearty appetites demand enough of the sap to rob the plant of a considerable portion of food; then we say "Chickadee, you are our friend, because of your help our apple crop will be better this fall, we thank you!"

But if a sharp-shinned hawk comes dashing along and carries chickadee away in his talons, for his lunch, we say "You rascal, you have killed our friend" and class this hawk as an enemy and plan vengeance.

Or, we might, after sufficient observation, say "This is a chickadee" write his name in our "list" and later enter "sharp-shinned hawk," congratulating ourselves upon adding two species to the "list."

Or, we might observe these birds, note size, shape, color, markings, write a description or even a sketch and color them; and all this would aid in knowledge of appearance of these birds and render more certain our recognition of these and of other birds.

Or, again, we might be fortunate enough to see Chickadee come flying to a dead birch of a few inches diameter, look around

sharply with quick motions of his head, but no sound, and pop into a round hole in the stump, remain almost hidden for a moment, only the tip of his tail showing, then we might see his head, with black, shiny eyes, appear, his bill full of fragments of soft wood, and after a look around to see if all is safe, a quick flitting to a distance of a few rods to drop the tell-tale chips, then back again for more digging, perhaps helped by his mate, and so on till the hole is deep enough.

Without question that stump would be "sacred ground," and the picture of it would remain in mind for all time. It would require no urging to watch the progress of the work, the home life of the parents, one bringing food to the other and, later, to the babies, and the advent of the young chickadees to the outside world. All the callings, and twitterings, and balancing and clinging in all sorts of positions, the friendliness and the trust of these feathered midgets, would give many a "thrill," and if, as easily can be done, sufficient confidence were established so that one of these mites would come freely to head, hand or even lips for a bit of nut held there, no thought of harming the little friend could even occur to the recipient of such trust.

Then what pleasure to be able to imitate the call and songs of chickadee, and others, many of which can be called to one, with answering calls, and songs, given only patience enough.

Which of these is the "best " kind of bird study?

Probably, in practice, we combine all of these in proportions to fit the needs of our "clientele."

The identification and description might be classed as purely intellectual, the consideration of food as economic, the perception of daintiness and sweetness esthetic, and the thrill of love and desire to protect as purely moral or spiritual. But why classify these results?

Personally, we believe that every member of a camp (or school) should "be exposed" to "catching" some interest in and love for nature and nature's doings. Not only that, but also that first or last, each should have here attention called, commandingly, to various phases of nature, although some lines might receive more emphasis in a boy's camp, others in a girls' camp, and, of course age and maturity would have influence. Converts are many times made that way.

A girl in one camp on the first trip loudly declaimed against Nature-Study, she'd "taken Nature-Study and didn't like it!" Later she was a devoted student. Another girl had bird-glasses, a little knowledge and more enthusiasm for birds and wanted to study birds, and birds only, "did n't want to study rocks!!" but after a trip on which she learned to recognize quartz, mica and hornblend, and saw some glacial evidences she wanted to "crack" every rock in sight.

A list of subjects is bare and uninteresting to the uninitiated so it seems best to discuss a few phases and methods somewhat in detail.

The stocking and maintaining of a balanced aquarium is always a delightful project and extremely illuminating.

First comes the purchase or making of the aquarium. It is well to have several, not too large, but of several sizes and shapes, but of clear glass with plane sides. Several books give directions for construction, cement, etc. so we omit these details here.

But our concern is with the living things to be introduced and kept in good condition. This supposes, first, either previous observations, or a trip or trips, to decide upon conditions needed, what to put in the bottom of the case—pebbles, gravel, sand, "mud"—the choice depending on what animals and plants we wish.

Shall one put in the plants or the animals first? There might be discussion now and confirmation might follow the results of the experiments.

How many, and what, plants can we find in water with a rocky or pebbly bottom, in water with a sandy or muddy bottom? Which of these grow entirely under water, which float on or below the surface, which are simply rooted below but have leaves and flowers entirely in the air? How do the leaves and stems of these differ? Why do they differ? Which of these do we wish in our aquarium? Which will be of any use to the animals and of what use are they? Which would add to the beauty of the aquarium and make it look more like a bit of the real pond, or of the sea-shore? How shall we make them "stay where they belong?" Will they grow better if rooted or floating?

These questions are answered of Mother Nature's ways of doing things. In other words the children are directly and consciously seeking answers to questions they wish answered.

The same procedure will be followed in regard to choice of animals for the aquariums. There will be the desire to put in every kind of thing that "wiggles" and every individual of each kind that can be caught, which will have dire results if the work is unrestrained. Sometimes it is a question how much restraint should be used, as many things are learned by failure, if the failure is rightly interpreted.

If the big sunfish, "or punkin-seed," so beautiful in color, "gobbles up" all other animals possible, and rushes around so vigorously as to uproot most of the plants, he will soon prove himself an undesirable occupant, and some other fish, smaller or less aggressive, be substituted, while he goes back to his native pond.

Or if the big dragonfly nymph devours all smaller insects that cannot evade it, or chews off the polywog's or fish's tail and even fastens upon the body of a snail before it can shrink back into its shell, it, too, will be removed to safer quarters and fed upon less valuable food. But it will be sufficient reward for all work if some day he is watched as he crawls up on a stem above water, and, hanging there, splits his hard skin down the back and with distinct effort pulls himself out. Then what a delight to watch him, after a brief rest from the struggle, transform the four limp lumps on his back into gauzy, veined wings that when dry glisten and glow in the sunlight like dewdrops or diamonds!

When he is thoroughly dry he flies off darting so quickly that the eye can hardly follow him, but, if one knows what to look for, it may be possible to see that some mosquitoes and gnats have disappeared along his route, and one realizes that the big appetite that made him a scourge in the aquarium is a blessing when it causes the removal of so many of the pests that have made careful study of ponds and marshes a trial of one's patience.

Gradually much is learned of the proper association of different forms of animal life, and several jars may be stocked to represent groups as they are observed in field trips.

The proper kinds and amount of food are learned by experience; overfeeding with a consequent fouling of the water by decay of the surplus is one of the first mistakes.

The proper lighting of the aquarium must be studied; too little light resulting in starving the green plants, with consequent suffering or death of animals that live entirely within the water, from

lack of oxygen. The overgrowth of green plants, including algae, resulting from too much sunshine, can be controlled by shading partially, or the results partly compensated by increasing the number of polywogs and snails that feed upon the algae.

These are only a few of the many, many things learned from experience with aquariums.

Vivariums offer a like field for the observation of land forms of plants and animals, under controlled conditions.

Both alike, well-cared for, are a delight to the eye, in form and color, and offer opportunity for close observation under nearly natural conditions.

A nature table or shelf should be a feature of every camp or schoolroom.

This may be large or small as conditions demand, but should always be well-lighted, and *always absolutely* clean, free from dirt, dirt here, meaning *anything* present with no reason for being present.

On this table may appear all sorts of objects at various times, frequent changes being essential to stimulate interest. In fact no day ought to pass without some change, either of removal or addition or rearrangement of some detail as a constant challenge to the attention of the "casual observer" as well as for more worthy reasons. But each thing should have a label! It may be a question, as:—"What is its name?" Where can you find this plant growing? Is this good to eat? Is this a land snail or water snail? What does this smell like? Why is this plant called "five-finger?" etc. When the label is used to tell the name it should be so connotated as to suggest more than the mere name, as:— "Storer's snake, or red-bellied snake, full-grown, young are born alive. This was found under a flat stone up on the hill-side. What do you suppose it eats? Is it helpful or harmful?" or "Common St. John's wort. See the dots on the leaves, and the one-sided petals," or "A Common land snail. Where are its eyes?"

Some day the table might be devoted to some one exhibit, as, a collection of fungi of as many colors as possible, thirty or more colors with tones and tints could probably be shown. Mycelium should be included. (Such an exhibit should not be allowed to remain till it becomes unattractive).

Another day a collection of minerals and rocks might be shown. Loose labels might be on the table with the suggestion that any one who wishes may place them on corresponding specimens. Much discussion will be aroused if enough people know *something* about minerals.

Another day there might be shown photographs taken or sketches made on earlier trips, to illustrate places and physical features, trees, ferns, birds or other animals, clouds or passing shower.

But all these so far mentioned deal with material brought to "headquarters" although necessitating field work, either in groups or singly.

What about trips afield?

We might discuss bird study, ferns, flower study, trees, stars, moon, or any other such topic, but rather let us devote a few minutes to some less talked-of subjects.

Personally, I found the study of minerals and rocks and physical features of the region extremely attractive to young people.

A labeled collection of the common minerals and rocks of the area, together with a few less common but striking specimens obtained on one or more special excursions to another section are treasured as choice possessions. For into that collection has gone much hard work in the way of breaking stones, trying their hardness, noting the faces, edges and corners, the lustre and color, the comparison with others' specimens, the endeavor to get a "better one," and many haps and mishaps, of scrambles, slides and clayey slips, good times all.

If we are in a glaciated area as most of us will be, then the observation of ice-work and water-work and their comparison, and the old, but ever fresh, story of the ice-sheet and its results of transported material, covered outline of hill and rocks, and scratched on the smoothed faces of the rocks will charm and arouse wonder. Always the evidence of change, in the "everlasting hills," always the question—what caused this?

On long trips and hikes there is constant outlook for new specimens, new changes. Another type of study, less common under topics of Nature-Study, but much in evidence among biologists under the head of ecology is the more intensive or shall I say extensive study of some limited area the observation of the living forms, plant and animal, the number of species and of individuals

of each species, the "lay of the land," the water, soil, slopes, exposure, etc., that is:—what are in the place and why are they there? as an effort to understand the relations and interrelations of the group.

To illustrate:

Let us look at a small pond such as may be found in many places in the northern United States and Canada. It is roughly circular in outline, only a few acres in extent, with sandy shores sloping rather steeply in the immediate vicinity of the pond, but at a distance of a rod or two the land becomes nearly level and spreads out in a sandy, dry area for some distance. The level, higher areas are sparsely clothed with a rather stunted growth of pitch pines, scrub oaks, grey birches, a few low bushes, blueberry or New Jersey tea, low blackberry vines, and androfrogon or poverty-grass, interspersed with other scanty vegetation. Nearer the edge of the water grow a few alders and willows, a group of red maples and sour gums, with sedges and water-loving grasses.

Standing with their feet in the water are rushes, button bushes, swamp loosestrife and cassandra. Farther out are yellow and white water-lilies, bladderworts, floating heart, potaneagetous, hornwort, myriophyllium and other plants, floating or rooted.

Dragon flies dart above the surface catching smaller insects, whirligig beetles rush wildly about in spirals, water boatmen come to the surface for air, caddis fly larvae with houses of various styles of architecture crawl sluggishly about on the bottom or on stems of plants, snails lay their eggs, a freshwater mussel ploughs slowly along, only the tip of his shell with the siphon above sand, making a line by which we easily trail him.

In shallow water, near the shore are some plats cleared of rubbish, over each of which a male pumpkin-seed stands guard; rushing fiercely at any intruder. This is the nest in which the female has left her eggs, now defended and protected by the father.

Newts nose along the bottom. Bullheads rumble along the muddy, deeper sections. Near that group of water plants is a school of yellow perch. Darting about in crowds are small dace. Perhaps a pickerel lies near shore so nearly motionless that his shadow on the bottom is the only thing to catch the eye, unless, alarmed, he darts off like an arrow from a bent bow.

Turtles are sunning themselves on a water-soaked log, but plop into the water at your approach.

Over by the alders are red winged black birds. Chewinks call from the bushes farther along. Redstarts "start" about, catching insects for hungry little ones in the nest up on a maple. A thrasher sings from the top of a grey, field birch. A red-eyed vireo's basket hangs from a branch, so low one can look in at it, and the mother stays guarding her treasures till one can almost or quite (!) stroke her. Slowly and heavily a nightheron flaps along to the cove across the pond, alights, wades out into the water and becomes like a stick in the water-scape, until a lightning-quick stroke of his sharp bill secures the fish or frog for the babies over there, half-a-mile away, in a nest that is one of two or three hundred.

Great heaps of white clouds drift lazily across the blue sky. Bees hum about the flowers, carrying pollen from flower to flower as they search for nectar, or, maybe pack some of the pollen in the basket on their back legs.

The dank smell of the mud, and lush vegetation forms a background for the waft of delicate perfume of the water lilies or stronger sweeter odor of the clethra, or the strong health-giving breath of the sun-soaked pines.

As one sits, munching some of the wintergreen leaves gathered a little way back, sight, hearing, smell, taste, touch all combine, and we "yield ourselves to the perfect whole."

Children may or may not wish to search deeper into the reasons for such groupings of animals and plants. Some will be keenly interested to search further, to find, for instance, that there is no inlet, no outlet to this pond, and to learn that it is a typical glacial kettle-hole, that the peat mosses and other bog plants are edging farther and farther into the pond, making a false bottom, perhaps, and that, given time enough, this beautiful little sheet of water will be swallowed up, changing into a swamp, later to become a muck hole, later still dry land, with a black soil, well-fitted for some garden crops. But everyone, however young or immature will store up these mental pictures for future pleasure, if only attention is called to various features which would, in most cases, otherwise remain unnoted.

The study of a leaping, laughing brook would offer a great contrast to the previous picture; the rocks, ferns, flowers, fish,

birds, all would vary in species and in habit. So, too, with other areas, deep woods, swamps, rocky hillsides. Each has its outstanding features, physical form, plant life and animal life.

If a wild flower garden is desired, or a fernery, such groupings of plants must be studied to bring each individual to fit its surroundings.

As Charles Goodrich Whiting says, plants love their own family and their own neighbors and only flourish when transplanted, if some of their neighbors are brought along, too.

If the nature councilor or teacher can look back on the season's work and say "I have given my charges a broader outlook on nature —a greater desire to see, and to ask worth-while questions, and to find answers to those questions, if within their powers, (or in extreme cases) a realization that there *are* questions, and greater than all that each being lives not to itself alone, but helps or hinders all neighbors," she or he will have done a great work.

A Boys' Camp that Almost Became Famous

By One of the Boys

Johnny's Island rises above the placid waters of an artificial pond in the town of Northbridge, Massachusetts. Two grammar school boys from the village a mile away, setting out on their first adventure, pitched a small tent under the protecting shade of a few pine trees on this island and there they remained for a week one July during the closing years of the nineteenth century. Their equipment was ill-assorted, but it represented a boy's idea of the necessities of life in the wilds; a cover, a sacking of straw to sleep upon, a blanket, a skillet, a coffee pot and a stew pan or two; and the food while it would not pass the proper tests of a balanced ration to-day was always sufficient as there had been a generous accumulation of griddle-cake flour and crackers, and a milk farm within a half mile was a comforting assurance when the fish failed to bite. The boys however discovered a few things during that week; most of all that camping had all the pleasures that were anticipated, and when July came again, once more the journey to Johnny's Island was undertaken with an addition to the equipment and to the enrollment. Thus the years went by and

the trend towards the camp became an annual pilgrimage. The boys went off to school and to college, new associations were formed, and new faces appeared on the camp site. The equipment grew until a moving van was required to move the goods from the winter storage loft to the island camp; while others joined the pilgrimage until as many as eighteen young people were frequently settled upon the island to enjoy the out-of-door life, the restful quiet of a New England pond beyond the reach of its industrial life, and the comradeship which only life away from the conventions can give.

For thirteen years this camp was maintained and in 1902, the last meeting of the campers convened on Johnny's Island. The camp in its completed state was the growth of years and its changing aspects represented the various degrees of demands in the life of a boy as he changes from his thirteenth to his twenty-sixth year. The old straw sackings were replaced by cots; the small tent grew to a colony of five and six; the rough fire place was abandoned and a home made folding camp stove was invented; the old grub pail grew to a kitchen tent; the lone canoe to a fleet of six; a ferry was run to the highway for the convenience of visitors; yet with all these changes it was out-of-doors, it was simplicity, and it was rare friendships. The camp was an evolving camp, built at the beginning according to the ideals which came from a boy's reading, but representing as time went on little of the story-book type but a type all its own. It was no conformist camp; it was maintained for one purpose at the closing years, for mutual improvement and pleasure.

The real leader of this camp was Lawrence Thurston, Yale 1898, and it was natural as the years went by that many of his classmates made up the list of guests on Johnny's Island. Early in his college course, Lawrence definitely decided to become a missionary, and the last years of the camp were marked by the presence of an increasing number of those whose life interests were the same as his own. After the camp of 1902, Lawrence Thurston with his wife, a member of the camp since 1900, sailed for China, but after a year of intensive work he was ordered home because of ill health and he died in Claremont, California, during the spring of 1904. A book, "A Life with a Purpose. A Memorial to John Lawrence Thurston, First Missionary of the Yale Mission" tells the story of his consecrated life.

It is rare that a boys' camp develops as the Johnny Island camp did. Among the names of those who sojourned there during the years of its functioning are many who in their own fields have become well known if not famous. Most of the members of the camp who enjoyed that last year together were facing their life work in missionary or allied fields, and the roll of its members reads almost like a page from the Missionary Who's Who. There was Brownell Gage who took up the work so well begun by Lawrence Thurston in China; Mrs. Lawrence Thurston, then Matilda Calder, now head of a girl's school in China; Enoch Bell, editor of a missionary publication; Brewer Eddy, a secretary of the American Board and one of its most effective speakers; Helen Calder, a Secretary to the Women's board; Robert Hume, professor in Union Theological Seminary; Robert M. Brown, professor in the Rhode Island College of Education; Hiram Bingham, discoverer and excavator of the Inca Capital; and many others.

Camping out comes as a normal suggestion to the thoroly American boy. In many cases it is not convenient to carry the suggestion to its fruition, but when it becomes the expression in the first place of a boy's love of adventure and then develops along the lines of his growing ideals, no healthier experience is open to him. The Johnny Island camp was unique,—it fell short of becoming famous, as communities in New England have become famous, only because it had to be abandoned when its members were at an early age. In 1902 it was abandoned temporarily because of the wide spread dispersal of its members; but no hope of opening again was ever seen when death took away its leading spirit.

Camping is a rare treat. It is frequently the transient experience of the American boy. When it results from an inner urge it is an experience which broadens the life of every one. The increasing number of summer camps advertised in our magazines is a healthy sign that dress and hotel life does not satisfy the youth, but an intimate contact with people and things is desired. If there can be any criticism of these camps it is because of a superimposed leadership, rather than a growth along self-imposed lines. The Johnny Island camp endured during thirteen formative years becuase the members became more and more self reliant; because they were able to meet themselves the changing conditions which increasing maturity and larger numbers entailed; and because they

were able to meet cheerfully such adversities, most of weather conditions, as might tend to discourage. No greater boon can come to any boy than such an experience as the members of the Johnny Island camp made for themselves during thirteen consecutive years.

Nature at Cowasset

EDITH V. DOUGLAS

Nature is such a vital part of the daily program at Cowasset that it is difficult to say just what part it plays and just where it comes in our camp life. I should say it is present nearly every moment.

Cowasset is ideally situated in a fragrant pine woods on the shore of Buzzards Bay, and Cowasset girls are particularly fortunate in being able to study not only the beauties of the fields and woods but to become acquainted with the peculiar little strangers of the shore.

The road from Junior to Senior Camp is a path cut through the woods and as the little Juniors saunter back and forth from Senior, they make many interesting observations and their enthusiasm is very keen. Always before dinner and supper bells my tent would be invaded with Juniors bringing in specimens of flowers or exclaiming excitedly about a bird they had just seen.

Of course, in order to get their nature point the girls are required to identify twenty-five flowers, twenty-five birds, fifteen trees, fifteen insects, fifteen small animals and ten ferns and mosses. I found that the girls were much interested in getting this point and there were few girls in camp who did not accomplish it before the summer was over.

The girls (especially the Juniors) were very proud of their note books and there was much competition among them as to whose would be the most original or whose would be the neatest. In these note books the girls kept lists of the birds, flowers, etc., that they had observed, made drawings and sometimes wrote up short stories about the particular thing observed. On rainy days the time was spent in leaf printing sheets for the note books and in coloring in bird and flower sheets.

We went on many hikes away from camp but there was so much to learn about right around our own bungalows and tents that if we return to Cowasset many summers we will always find new inspiration.

The girls are wide awake to observe everything about them. When they are swimming they find a fiddler or a horseshoe crab and come running up to want to know all about it. When at Arts and Crafts they notice that the logs of the crafts bungalow are stuffed with moss. They discover it is peat moss. What is its history and usage?

After rest hour many girls can be seen in the grove looking for new specimens and before warning bells will have added many to their lists.

So I consider that nature can not be set down for a certain few hours during the week but if the girls are interested they will be constantly on the lookout for the wonderful things that they can see no matter where they are. If a nature councilor has aroused that interest I think she will feel that her summer has not been in vain.

The Mt. Washington Trip

OLIVIA J. CHURCH

Camp Allegro, Madison, N. H.

During the summer of 1921 a party of fifteen girls and councilors from Camp Allegro started on a three day hike to Mt. Washington.

We went by machines to the foot of Tuckerman's Ravine and at noon started our climb. As we left the forest behind us, we saw ahead the apparently perpendicular wall of the ravine. We could see nothing beyond and were disappointed for a minute, thinking we beheld the peak of Mt. Washington. We exclaimed, "It is so straight! How can we ever get to the top!" But our hike master assured us that it was by no means as precipitous as it looked so after a light lunch by a cold stream, we started on again discovering just enough perilous spots to give us the much desired thrills.

The cold mountain wind had sprung up now and it was growing late, so we took the trail to the "Lake of The Clouds Hut," where

we were expected for the night. Here we met two travelers going our way, and we all enjoyed a warm, wholesome supper, made merry by the chatter of the events of the day. We were as one family as, after our meal, we listened contentedly while one of our group read aloud from a volume of poems written by a nature lover, whose lines appealed to the girls, for they often mentioned their enjoyment of the pleasant hour.

Off before daybreak the next morning, we reached the summit of Mt. Washington in time for the sunrise, which preceded a fair day, so that our view of the surrounding country fulfilled our expectations.

Together with our friends of the previous evening, we now left Mt. Washington, passed Mt. Clay, and reached Mt. Jefferson just at noon. Here we held our simple Sunday service, which inspired us with a greater appreciation and love of God's great out-of-doors.

Our party ate the noon day meal beside a spring and here parted from our two friends so quickly made. While the more ambitious of our number climbed Mt. Adams, those of us who remained behind, rested until their return, when we all made our way back to the hut.

The shadows were creeping up the ravines when we again reached our shelter. Here we found some new and interesting friends, three naturalists one of whom was a great lover of birds and who is quoted by Frank F. Chapman in his "Handbook of Birds." These men told us interesting incidents of their trip and, among other specimens collected, showed us a piece of black spruce taken from a tree which had grown only a few inches in height and whose rings proved it to be fifty years old.

On the third day we started home by way of the Southern Peaks of the Presidential Range and in the late afternoon reached Crawford Notch where with hearts filled with pleasant memories, we took a train for Camp.

NEVER BE DISCOURAGED

H. F. G.

Camp Director of the Aloha Camps.

Perhaps a word to hearten all camp directors who are trying to give their best inspiration and leadership to young people in learning to know and love out of doors may not be amiss. The work is so new in its manner, as developed in camps that we have not yet even the right name for it. We do not mean Nature Lore—nor Nature work—nor Wood-craft, rather we mean a good deal of each and even more. It is no wonder we can't find geniuses in these lines graduating by scores from our over-packed colleges. We are quite certain we do not want primarily scientific experts to teach our campers. Even at the thought, I can see bloomered camp girls taking to cover. Just what are we looking for in the persons who are to be the leaders of our campers in out of door life, close and intimate with Nature? It is true we are looking for persons who are learned as to birds and beasts and flowers, who know trees and rocks and clouds and stars, but they must not be erudite at the cost of being human. They must know and love young folks so well that no labor will seem too great in getting the campers to be on joyous, intimate, intelligent terms with the life about them.

Our Nature leaders, if such we may call them till some one has coined a better term, must have red-blooded enthusiasm for the camper as well as for Nature. They must not have peered through a telescope or a microscope, so exclusively, as to have forgotten how lovely and lively the growing young camper is at his elbow. We are looking for leaders with the naturalist's training and enthusiasm plus the kindly understanding heart toward the young learner—someone who has that glorious gift of leadership that makes young folks love to follow and to hear, learn and to copy him. Our aim is too big to be attained in one, two or possibly ten summers, but if we have, with the help of such leaders as I have indicated, created an attitude in the campers mind toward the world of Nature about us of eager, earnest, curious study, we have done something. If we have made our campers feel that camp life opens to them a great world of life thrilling, delightful, beautiful, mysterious, awful, that they must know and conquor and enjoy and beautify, we have done much. If our campers can go off on hikes or water trips with "eyes that see" and "ears that hear" after many summers at camp, we shall have given them a source of growth and enrichment beyond price.

Second Nature-Lore School

The Second Nature-Lore School for Camp Councilors was held at Camp Kia Ora, Lake Morey, Fairlee, Vermont. Some of the lectures were held at Aloha which is half a mile around the lake.

Kia Ora is on an exquisite mountain lake among the Vermont hills. The region abounds with birds. There were nearly twenty birds which built their nests on some part of the assembly hall. Everywhere nature was abundant. Ferns and orchids were in the nearby woods. One could not ask for greater riches of nature. The Camp hostess, Miss Clara V. Coyle, made every one feel at home and Mrs. Edward Gulick was a good neighbor.

The course was based on the earth sciences which were in charge of Professor C. P. Sinnott of the Bridgewater, Massachusetts, State Normal School. This work was admirably handled and later was reviewed in pageant form by the various teams.

Mr. Carl Rankin, of the Marquand High School, Brooklyn had charge of outdoor cooking. At least one meal per day was cooked in the open. The chicken roasted in a hole in the ground will be remembered for a long time as a dish fit for an epicure.

Professor Anna Comstock, of Cornell, we like to think of as the Dean of American Nature-Study. She offered inspiration from all phases of nature. Her talks in the recreation hall will form a pleasant spot in the heart of every naturer who heard her. If the councilors were able to radiate a small bit of her enthusiasm the nature world cannot help but be cheerier and broader.

Professor and Mrs. Vinal brought the experiences of the first Nature-lore School. The trail to the peat bog—the orgies of the quaking bog—the capturing of the ground hog—the oven bird's nest—the scouting games—were passed on to the hundreds of girls in the summer camps.

And Professor and Mrs. Kinsey, from the University of Indiana came down from Aloha to lead in some delightful bird trips.

The week was, as some one said, the Biggest, the Best, and the Busiest. All vowed that they would be at the next school in 1922.

THE STAFF OF THE SECOND NATURE LORE SCHOOL.
From left to right: Prof. C. P. Sinnott, Prof. Vinal, Miss Clara V. Coyle, Mr. Carl Rankin, Mrs. A. B. Comstock, Professor and Mrs. Kinsey.

CAMP NATURE-LORE EXHIBITION: The American Association for the Advancement of Science holds its next meeting in Boston. This comes during *Christmas week.* There will be about three thousand scientists at these meetings. The National Association of the Directors of Girls Camps is invited to meet with the American Nature-Study Society at this time. You are asked to keep this in mind during the summer months and get together an exhibition that is worthy of your camp. Many of us believe that the schools should absorb some of the methods used in camp and here is an excellent opportunity for us to show our worthwhileness. This meeting will be worth while for us and we have a contribution that will be worth while for the scientists. These are the kind of people that you want interested in your camp. They will want to know about this great movement in education. The program will be in the REVIEW for *November.*

The Committee
MRS. EDWARD GULICK, The Aloha Camps.
MISS ELEANOR DEMING, Camp Mirimichi.
WILLIAM G. VINAL, Camp Chequesset.
Chairman.

THE NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN ELEMENTARY SCHOOLS

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Editorial

Blue mountains, bluer lakes, beautiful forests, dashing streams, squdgy, overgrown swamps, rocky heights,—all these formed the environment of the second Nature-lore school for camp councilors last June. Mrs. Gulick was to have had us at Camp Aloha but at the last moment was obliged to turn us over to her neighbor, Miss Coyle at Camp Ke Ora, and no one could have been a more sypathetic, helpful and efficient hostess than she proved to be.

The pupils who gathered there were the kind that one loves to teach; they were eager, ready for anything, and had a true appreciation of the value of nature-study in camp life. Many of them had already worked in camps and were keen to get hold of methods that would make nature-lore an integral part of camp life.

There were lectures in the early morning in the recreation hall and a bluebird took this opportunity to demonstrate her originality by building her nest in brazen robin fashion *on the top* of a post of the porch before our very own eyes. The days were given to hikes, each one for a special study of trees, birds, plants and especially of the geology as recorded in the mountains, valleys and cliffs and interpreted by our inspiring leader. At odd moments we invented tree games, bird games and every other kinds of an out-door game that we could think of; and we had our suppers anywhere in the landscape that we chose and had them cooked over as many different kinds of fires as our camp craft leader was master of and that is saying much; and at night we studied the stars and then sought our woodland shacks which were filled with the brooding spirit of slumber. Such restful nights they were, even though once in a while an importunate whip-poor-will took a fancy to serenade us. It was as a whole a most interesting week, helpful and inspiring alike to teachers and pupils.

THE NATIONAL ASSOCIATION OF THE DIRECTORS OF GIRLS CAMPS

Announces the Third Annual

Nature Lore School For Nature Councilors

THE STAFF: We believe that this faculty and their subjects are unique. Every leader is a naturalist. He practices what he preaches. He has made good with children. He is known outside of this fifty mile radius. He has a distinct message for every nature guide. He is not shackled by a course-of-study. He is human.

Anna Botsford Comstock, "*The spirit of Nature-lore.*" Dean of American Nature-study; Professor of Nature-study, Cornell University; Author of the Handbook of Nature-study, (the best textbook in nature-study); Ed. NATURE-STUDY REVIEW.

Thornton W. Burgess, "*Nature stories about the Camp Fire.*" Ask the children who Thornton Burgess is? He is coming back home, down on Cape Cod, as he says,"where my love for the out-door life was aroused and where I unconsciously laid the foundation for my present work. There is but one Cape Cod. I love it." He will tell about his method and we will try to catch his spirit. Note that he always tells the truth about his animals. We need to hear more of *the truth.*

Marie Stillman Russell and Mary Stillman, "*Handicraft with Native Materials.*" Teachers, artists, naturalists, composers. Both were nature councilors at Teelawooket for two years. We believe that crafts in camp should not be a repetition of what one gets in school. It should involve the handiwork of the old homestead of the region in which the camp is located. Mrs. Russell was formerly head of the Art Department in the Rhode Island College of Education. We believe that these two sisters are fitted to show how the nature councilor and the craft councilor may correlate their work.

E. H. Forbush, "*Living experiences with living birds*" rather than fact stuffing about stuffed birds. Professor Forbush is Director of the Division of Ornithology for the State of Massachusetts. He is an author of note and founded the Massachusetts Audubon Society. Among other things he will give a course in

bird banding and tell how to organize such a society at camp. Mr. Forbush is president of the New England Bird Banding Association and the work is to be under the Biological Survey at Washington. Records and material will be furnished camps free. Fifty bird houses have been ordered from the May Bros., Cohasset, Mass., for this work at Camp Chequesset.

Delia I. Griffin, "*The Camp Museum*," not a store house for dusty relics where moths and thieves break in and steal but a live working camp museum. Miss Griffin got her love for nature in Vermont. She is curator of the Children's Museum of Boston. Every councilor will be given guided experience in this important art. This may be a connecting link with our exhibition for next year.

Manley Bacon Townsend, "*Sunday Night Talks Out of the Environment.*" Mr. Townsend has a boy scout troop. He is a lecturer of note. He was formerly Secretary of the Audubon Society of New Hampshire. Before we say that he is a clergyman let us add that he is genial, optimistic, has a hearty manner, is scientific, and believes in the great out-of-doors. He does not scold or sermonize but talks like a man to men. Ask the 1920 members of the nature school about him. They know.

Dr. Henry P. Lovewell, "*Medicinal Plants.*" Dr. Lovewell is a practicing physician. He also has a hobby of collecting medicinal plants. He will show us how a nature councilor can be a "first aider." Then we'll go out and collect aromatic herbs for the camp attic—just as our great grandmothers did in days of yore. Let's revive the custom just for fun. And the campers will just enjoy it.

William Gould Vinal, "*Nature Games, and the Camp Notebook.*" Professor of Nature-study at the Rhode Island College of Education. Believes that the Nature-lore School is a great institution for inspiration in nature-study. Believes that every camp should base its activities upon its own environment. Believes that good nature councilors are rare. Believes that all nature councilors should be given an opportunity to meet the best leaders in the field of nature that they may carry over the inspiration to the young people of America. Believes that the camp is an educational institution.

THE PLACE: Camp Chequesset, Wellfleet, Massachusetts. Down on Cape Cod. Cape Cod has long been known as the meeting place of northern and southern plants and animals. The mountain plants venture into its cold bogs. Here one may learn how to interpret lake shores and shifting dunes; glacial deposits and primitive peat. Agassiz recognized the Cape as cosmopolitan nature when he established his summer school on Penikese. Thoreau walked the whole length of the Cape and reveled in its natural wonders. Cape Cod is still unspoiled by man and again comes the call to study nature on its rugged shores.

TIME: Arrive Thursday noon, June 22; leave Thursday afternoon, June 29, 1922.

HOW TO GET THERE: To reach Camp Chequesset from New York by the Fall River Line, leave Pier 19, North River, 5 P.M. Wednesday, June 21, to Fall River, thence by train to Wellfleet, arriving at 11.33 A. M. on Thursday. Fare $7.71.

Those coming via Boston take the Cape Train from South Station, 7.35 A. M., Thursday, June 22. Purchase ticket to Wellfleet. Meet in the Barnstable section of the large waiting room. Fare $3.83.

The New York party joins the Boston Party at Middleboro. Each member will be sent a badge so that he may recognize other members of the nature school. The badge is an introduction and you may lose much valuable time if you do not get acquainted right away.

The camp is also accessible by state road. Watch for the big nautical wheel just before crossing the railroad track into Wellfleet Village.

Some may wish to go back via Provincetown and Boston. In this case they will take the train to Provincetown, having about two hours to see the first landing place of the Pilgrims and other historic places. Then take the steamer "Dorothy Bradford" across the Bay to Boston, arriving about 6 P. M.

ENROLLMENT: The fee is $35.00. Please send enrollment and check to William G. Vinal, Rhode Island College of Education, Providence, Rhode Island.

The first opportunity of enrollment is given to the members of the National Association of the Directors of Girls Camps.

Directors wishing to enroll themselves or their nature councilors, or their craft councilors should do so before May 1, 1922. If the places are not all taken by May first the vacancies may be taken by nature leaders from other organizations such as the Scouts, camp fire, boys' camps, schools, churches, etc. These will be accepted in order of receipt.

Receipts will not be sent where payment is by check. When enrolling, state full name, address, Camp Director and address; and camp represented with address.

WHAT TO BRING: Blankets, sheets for single beds, a pillow slip, rubbers, enthusiasm, a sharp pencil, and a sharp eye. (Notebooks, paper, colored pencils, maps, and other materials will be furnished by the school).

PROGRAM: To vary with the spirit of the weather.

Half day around camp.—Notebook, gardening, nature games, leaf printing, bird calls, microscope, tow net, aquarium, vivarium, score cards, maps, rainy-day nature-study, weather, library methods, camp museum, decoration, nature photography, bird banding.

Half day in the field.—Making friends with the birds, scanning the shore, conserving wild flowers, protecting the forest, exploring swamps, gathering minerals, reading hills, traveling by compass, path finding by map, surveying ponds, collecting herbs, hunting small animals, foraging expeditions, cooking out-of-doors, observing nature's laws, visiting the hermit, studying forgotten posy gardens.

Evening features: Lectures, round table discussions, chats by groups.

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THE
NATURE-STUDY REVIEW

VOL. 18 MAY, 1922 NO. 5

Photo by Frances G. Conrad

A Los Angeles Foreign Class on a Nature-Study hike above the clouds. Mount Lowe.

Young America and Nature-Study

Dr. R. W. SHUFELDT

It is a good thing to know that so many of our boys and girls are interested in all that nature offers, and that this interest is not confined to any particular part of the country or to any special class of children. Not long ago, I pointed out in *American Forestry* that there were nature-study classes in some of the cities of lower

California composed almost entirely of the children of foreign peoples; but that our own boys and girls really lead in these pursuits in that section is well shown in some of the beautiful photographs sent me by Dr. Charles L. Edwards, who is Director of Nature-Study in the schools of Los Angeles. Two of these photographs are here reproduced on page 163 and they were taken by an assistant of Doctor Edwards, Miss Frances G. Conrad. The upper picture shows the Annual Seaside Excursion to Pt. Fermin, and 3000 school children of Los Angeles are seen studying the animals and other things found in the tidepools of that famous locality; below, we have another scene, taken at the same time and place, in which some of the children are in the foreground.

The material for study in nature is practically limitless; and were a million children to gather such specimens and to study them in their minutest detail every day for many, many generations barely a beginning would be made toward the completion of what there is to be known about plants and animals and all the rest that nature offers in our great country, to say not a word of all the rest of the world.

It is not unusual to have parents, and, what is more discouraging, teachers—though not nature-study teachers—ask what is the practical use of this branch of study to children. What does it lead to, and what is its value to grown-ups. Well, it stands to reason that professional biologists and naturalists have all the use in the world for it, as it constitutes their working-stock of knowledge; but for the average boy and girl in private and public schools it possesses, as a study and a training, no end of uses—even though any particular boy or girl should not have it in mind at all to follow up the subject as their life's work.

Upon comparing any clear-minded, healthy boy or girl, who has had a complete course in nature-study in a public or private school—both class-room or laboratory instruction and field work in its different departments—with those who have not enjoyed such instruction, this comparison will, when properly made, reveal the fact that the character, qualifications, and faculties of the former, as contrasted with the latter, everything else being equal, be found far and away ahead in many practical and important particulars. Take the boy, for example. It will be found

Photos by Frances G. Conrad

Three thousand children of Los Angeles Schools studying the animals in tide pools at Pt. Fermin on the Pacific Coast.

that his out-of-doors training in nature-study has resulted in giving him a fine physique, backed by continual excellent health. From constantly using them, all of his senses are keen—such as his eyesight, his hearing, and the rest. His powers of observation have been cultivated to a high degree of refinement; and let me

tell you right here that a good observer holds, in any course in life, the reins of success in his hands—as compared with the one who is lacking in it—in a proportion that is truly remarkable. With good powers of observation comes good judgment and the ability to render correct decisions in many matters vital to success, together with the ability to assist others.

As for the one who has had no complete training in nature study as a child, it is to be noted that such a person, upon arriving at maturity, has no conception whatever as to his or her relation to other living forms in nature; no appreciation as to his or her place in the system and no knowledge of the factors constituting environment; not a single correct idea as to man's evolution, much less as to the origin in time, of any other living creature—or extinct one for that matter.

Again, nature-study soon leads to studious habits, and to the reading of many books on many subjects—all of which is of great advantage. Between this reading and out-door life, and the contact with all that nature presents, is developed a character possessed of charity for one's own kind, and the proper consideration for all living forms below it—an attitude thoroughly inconsistent with such undesirable attributes as cruelty, narrowness of mind, selfishness, and lack of refinement. With nature-study comes, too, a training in drawing and the use of colors; the use of certain instruments of precision—as the microscope and its various adjuncts; the field glass; tools for measurements, and various others having to do with skill in use and with practical ends.

An all-round nature student is usually a good swimmer, runner, and climber, with trained hands and limbs for other purposes; such students, too, generally stand high in manual training, in the skilful use of tools, and in not a few of the mechanical devices employed by the artisan and members of the various professions in their several lines of work. In short, graudates in nature-study, with an inclination to follow it through life, usually make good citizens and all-round, up-to-date Americans—factors in a race that can, as a rule, be thoroughly depended upon in war, in peace, and in the various activities that go to make up our lives and relations to our fellow beings, not omitting the living forms in the balance of animated nature.

Photo by Elizabeth F. Burnell

Children of Jefferson Street School studying a gopher and king snake. Los Angeles, Cal.

Nature offers us for study all that we find in the Vegetable Kingdom; and all that we find in the Animal Kingdom, from the very lowest forms up to include our own species, which last stands, mentally and in all but a few minor particulars, at the head of the series. Then we can study the form of the Earth and its crust, as far into it as we can reach, including the various fossils it contains and the elements of which it is composed. Also the study of all fluids and solids of the globe, and its atmospheric envelope. Some recent nature books add to these subjects the study of elementary astronomy; the weather; snow, hail, and rain, and a few closely allied things.

Young nature students should secure a camera as soon as possible, and learn to use it; but this is a subject I trust to take up for you later, as it is altogether too important a branch of nature-study to skim lightly over.

Nothing is so contagious as enthusiasm; it is the real allegory of the tale of Orpheus; it moves stones, it charms brutes. Enthusiasm is the genius of sincerity, and truth accomplishes no victories without it. *Bulwer*

Fallen Leaf Lake near Lake Tahoe

Field Trips at Fallen Leaf Lake

MARY E. DELPORT

1601 Oxford St., Berkley, Calif.

Imagine yourself bird hunting in the high Sierras under the leadership of an ornithologist sent there for the express purpose of adding this attractive feature to your summer vacation! To the true nature lover this sounds like "such stuff as dreams are made of." We have had vacations—many of them of the stereotyped kind; hiked in the woods, climbed mountains, cooked out of doors, slept under the stars; in a word, we have accomplished all the wonderful feats that the time and the place have inspired. But how seldom have we actually included in the glories of the wilderness, an intimate acquaintance with the wild-folk that contribute so largely to making that same wilderness so attractive to us. To the large majority, birds are just birds in the abstract sense, and they are nothing more and to single them out, study their characteristics or their songs, rarely ever occurs to us.

Out in California during the vacation season of 1919, the California Fish and Game Commission, in answer to a popular demand, outlined a schedule of fields trips from a number of resorts situated around Lake Tahoe, the object being to interest the summer vacationist in California's wild life resources. The region chosen was a most fitting ground upon which to stage this novel program, and so successful was the attempt, that the National Government has seen fit to duplicate the work under the same leadership, during the 1920 and 1921 seasons in the Yosemite Valley. Enthusiasm runs high over the results obtained at the latter place and we have every reason to believe that the program is with us to stay and will be repeated in the Yosemite and other national parks throughout the state during subsequent seasons.

The trips at Lake Tahoe started at Brockway on July 2. Five days were devoted to this resort with an average daily attendance of fifteen. The work progressed day by day until five resorts were visited and at the close of four weeks, three hundred and sixty-two adults and one hundred and fifty-seven children were recorded as having participated. During the 1920 season in Yosemite the number rose to 27,047; the results obtained during the 1921 season at this same place are still higher. Each day's trip was supplemented by an evening's talk and a discussion of some interesting topic relating to wild life and its conservation.

The concluding trips of the Tahoe program took place at Fallen Leaf Lake, some two hundred feet higher than Tahoe,—a spot unsurpassed in rugged beauty and serving as a convenient entrance to a region abounding in mountain lakes, high peaks, lovely glens and glades of fancy's own making, and offering at the same time, unusual examples of the wild life of the Sierra. So memorable were these first days that I have since glanced over my field-trip notes more than once and from them been tempted to run off the following account of a typical day spent in this fascinating combination of educational and pleasurable pastime.

We had left Tallac late one afternoon and dusk had overtaken us before we arrived at Fallen Leaf Lodge, but the end of the trail revealed a bit of Sierran magic enveloped in the shades of an opal. Out of the east the pink-purple alpenglow spread

like a filmy veil over mountains fringed in green, while the clear, blue sky above beheld itself in the crystal waters of the lake below. Through it all wafted the scent of pines, spicy and sweet,—elusive as a fairy's breath, but full of the enchanted wildness scattered so profusely on all sides.

A late robin flew out of the brush, crossed our path, and perching himself on a pine bough, looked out over the stretch of purple world below. The last flush of day had died and we waited the twilight to steal out of the heavens and spread its pall over the beauty around us. The robin still lingered, and who knows but what he, too, had stolen from his nest to watch for the stars as one by one they blossomed in the blue field above and gently sprinkled their golden shadows into the lap of the waiting lake below. We lingered until the young moon came out of the west, ushered by jeweled stars, and hanging like a lantern from a bridge of pine boughs above, lighted the way to our cedar-bark cabin, a picturesque abode overlooking the lake.

The robin, too, no doubt had flown to his nest, and in the sacred stillness, something of this seemed to echo through the walls of our consciousness:

"O God of Little Birds
Who breathed into our wings to make us light
And painted them with colors of His sky,
All thanks for this fair day, for meat and drink—
Sweet sky-born water caught in cups of stone,
Sweet hedgerow berries washed of dust with dew.

And thanks for these good little eyes of ours
That spy the unseen enemies of man,
And thanks for the good tools by Thee bestowed
To aid our work of little gardeners,
Trowels and pruning-hooks of living horn.

Tomorrow we will fight borer and blight,
Forgive, Thy birds tonight their trespasses,
The stripping of a currant-bush or two."

The day began at sunrise next morning when we stole out in time to greet our late robin, his breast to match the dawn, as he flew back and forth to the lake-shore where undoubtedly he got his worm.

Right in front of us a noisy quack-quack sounded, and out of a marshy covert, nine shiny mallards started a parade over the glassy surface of the lake,—monarchs at that early hour, of all they surveyed. Starting towards the lodge, we stopped to listen to the greetings of a dainty, fluffy bit of yellow dancing about on a dogwood that enveloped our cabin. On closer inspection we discovered a household of these yellow midgets and by their black caps we identified them as pileolated warblers, chirping and bustling about, all alive for the chores of the day and just now engaged in foraging for breakfast. Following their example we reached the dining room and lingered there until the gathering of bird-hunters on the porch outside gave us the signal that the climb to the Angora Lakes was about to begin.

At the foot of the trail we crossed a gentian glen, cool and shadowy, the blossoms like bits of azure sky sprinkled from above into a mossy bed of green. Right over our heads in the pine branches, chubby bits of gray pranced about and a chickadee-dee-dee in a wheezy, chirpy chorus rained down upon us. Upon closer inspection we found this stately old pine transformed into an up-to-date apartment house, for each limb furnished another story to house these active little creatures. Perfectly oblivious of what went on about them, they swung nimbly about, playing what seemed a game of see-saw, heads downward part of the time.

The caravan had started the descent of the trail, not however, before they had located the loud, screeching call of a jay. A beautiful, dull blue-fronted bird with a darker crest sailed across the gap, followed by three more of his kind. These mountain jays are more ornate than their coastal cousins, but their voices have the same loud, rasping quality.

Three little brown striped chipmunks emerged from the brush, stared and started off again, quick as darting shadows across the trail. A few steps onward and another call pierced the silence, this time a queer, nasal quonk-quonk-quonk. A nuthatch, small, bluish-gray, with a black cap and white throat and breast, firmly planted to the bole of a tree, started zig-zagging upward, pecking

and chipping the bark as he traveled. This bird, we learned, is a veritable acrobat in his kingdom, creeping up and down and swinging to and from branches with the greatest ease; he is also of incalculable value from an economic standpoint, as his food is mainly insects and their eggs, which he gleans from the bark of trees.

A pair of golden-crowned kinglets proved our next find; in fact, the fir tree to our right housed more than one family. These little jeweled bits are well camouflaged in pines or firs, but they prove an easy find, even to the amateur, by their queer scolding chatter which one can hardly attribute to such dainty morsels. Something of the mystery of bird migration attaches itself to these birds when we consider that they nest high up in these mountains in summer and make a long journey to the coastal region for winter quarters.

Right here we rested, turning our attention from the treasures above to those scattered at our feet. To the right a shady patch of meadow rue mingled its fern-like branches with the delicate columbine and wild aster. Pink dog-bane crept along the edge of the trail and farther into the thicket a row of skunk cabbage hedged in this little mountain bower. Underneath and almost hidden, we found the dainty pyrola, like beads of pale coral dropping from a jade-green stem. Over it all the stately pines towered to the blue above, and the sun, stealing through their branches, shot little sparks of gold into a background of soft, feathery green. Farther along we found beds of Indian paint brush, pink spirea Queen Anne's lace, delphinium and golden rod, as well as the dashing magenta of the fire weed and the dainty blue of the monk's hood.

A white-headed woodpecker, in characteristic pose, called us from our flowered reverie, and after observing this bird at close range, we resumed our journey up the mountain side. We had now entered the lodge-pole pine and hemlock belt and we expected to meet at this altitude, some of the higher mountain birds of the region. We had not long to await our reward for soon a large black and white bird swooped across the opening and by its loud raucous call we fixed its identity as that of Clark's crow or nutcracker. There were others, too, of the same feather, bizarre and noisy, who vied with the first in their screeches and screams. To

help things along somewhat, a couple of jays had come up from below and joined in the chorus and we listened to a very unusual and unmusical bird concert while it lasted. Birds of a feather surely flock together, for what modest little songster could live within hearing distance of these bold ribalds. The concert subsided somewhat before we left, followed by a continuous chatter, and we decided that if gossip was a propensity among birds, the gift had surely fallen to Clark's crows in particular.

We had now reached the summit of the ridge with Fallen Leaf stretched below like a sheet of lapus-lazuli. Tahoe farther on folded in by gray-blue mountains, completed a vista almost too beautiful and full of magic to be real. Turning away from the scene, we entered a little meadow which ended on the shores of the first lake of the Angora group. These lakes, three in number, nestle together at the foot of Angora peak, a bold, castellated member of the ridge that overlooks Glen Alpine and a vast country beyond. Some fine examples of hemlock and juniper adorn the sides of this peak, and patched here and there with snow, it presents a typical Sierran picture.

The long, slurred note of a pewee started us on another quest, but we stopped before we located it, having sighted a flicker, whose rich shades of spotted brown and red looked like a dash of Persian brocade adrift in the wind. Farther on, and nearer the second lake, we found a Sierra creeper. Quick as a flash, his tail planted firmly against the bark, woodpecker-fashion, he started his spiral ascent up the bole of a fir tree. His behavior appears somewhat automatic and one might easily compare him to a tin toy wound up, somehow attached to the tree and left to follow the course until it unwound itself. Unlike the nuthatch, this bird does not crawl down, but instead flies from the top to the bottom of the tree, crawls up again and repeats the process, meanwhile pecking away at the bark for food which consists mainly of insects.

We had left the three Angoras and had started on the homeward trail when glancing upward we spotted twelve white pelicans flying over Cathedral Peak,—a rare find to be sure. Imagine these heavy birds grecefully carrying their weight at an elevation of over ten thousand feet, while we poor mortals puff and pant at much lower elevations. The pelicans, we learned, were probably

on their way to Pyramid Lake in Nevada, one of their favorite breeding grounds.

About noon we retraced our steps and started the descent of the trail, listening all the way to the jingling notes of the juncoes as they gathered in little social groups in quest for food. A Calaveras warbler proved a new find as we stepped out upon the road again, having completed one of the most successful trips of the number allotted to Fallen Leaf.

There were other trips as full of profit and rare finds as the one to the Angoras. Glen Alpine, carrying all the beauty and charm that its name implies, furnished endless material for profitable quests. Here we found quail, fox sparrows, purple finches, warbling vireos, pewees, many varieties of warblers, the fascinating ouzel and the hummers; in fact every bird in the region seemed to pay allegiance at some time or other to this locality.

Another trip toward Tallac, through hedges of choke cherry, deer brush, service berry and coffee berry, introduced us to a Townsend's solitaire, an evening grosbeak and a pair of Western tanagers,—all within close range at the same time. An olive-side flycatcher, that shy fellow who keeps himself so high above the rest of his companions that one rarely ever steals sight of him, made the air vibrate at times with his continuous, insistent call. A lazuli bunting, too, was heard but we were not fortunate enough to locate this beautiful specimen.

One day, toward the end of our stay, we located two nests,—one of the Calliope hummer, the other of the Western wood pewee. These nests were on opposite trees, well exposed, but still difficult to observe, especially the hummers' as it appeared more like a slight hump on the crotch of a limb. Every afternoon thereafter we sat on the porch of a little eyrie and watched the patient parent pewees feed and care for their young. They took turns in leaving the nest, catching an insect, which they made known by a quick snap of the bill, flying back and fluttering affectionately over their young while they fed them the dainty morsel. It took each parent about three and a half minutes to complete this operation. Their lives were somewhat menaced by the haughty jays that hovered around in an effort to plunder the little brood, and while we admired the coloration of this latter bird, we agreed then and there that beauty is only skin

deep in the bird kingdom as well as in some other higher orders of creation. One day we came, but the nest was empty. Upon close observation, we discovered one little panting bird hidden under an old log. We watched him carefully and wanted so much to take him in and care for him during these first days; but we dared not, as he was undoubtedly going through one stage of his growth and must be left to start the battle on his own feet. The parents had gone off for a short vacation, no doubt, which they justly deserved. We concluded too, that if there is such a place as a bird-heaven, surely these parent pewees had already earned a place therein.

It was hard to leave Fallen Leaf and break away from the associations we had gathered in the great out-of-doors; hard too, to leave paths of peace and magic and come down to earth and the "crowded roads that run so straight to pain," but we came back with new appreciations and deeper revelations of the beauties of the wilderness and the life it sustains.

Better than any personal gain was the realization of the incalculable benefits bestowed on the many individuals who had partaken in this pioneer work of becoming acquainted with nature through actual contact and first-hand education under a competent instructor. The results accomplished have opened the way toward bigger things in the same direction for future workers, and the fact that there is a group of interested, enthusiastic followers fairly clamoring at the gates for just this sort of education, is the most encouraging indication that a definite program will be outlined to meet this demand. As John Muir put it "Even the scenery habit in its most artificial forms, mixed with spectacles, silliness and kodaks; its devotees arrayed more gorgeously than scarlet tanagers, frightening the wild game with red umbrellas,—even this is encouraging, and may well be regarded as a hopeful sign of the times."

Dr. E. Lawrence Palmer of Cornell is teaching at Berkeley, Cal. during the Summer Session of the University of California.

The Yellow-bellied Sapsucker.

Alvin M. Peterson

West Allis, Wis.

Some birds like some people have bad reputations. The blue jay has been known to steal the eggs and kill the young of other birds and crows and grackles to steal corn. Rightly or wrongly the yellow-bellied sapsucker has a worse reputation than any other woodpecker. He is accused of tapping trees, sucking the sap as it flows from the holes, and eventually girdling the tree and thus killing it. His friends, however, call attention to the fact that he destroys numerous harmful insects, catching and eating them in large numbers as they hover near the sap cups which the bird has made in the trees.

A small grove of maples and oaks that I visit occasionally has for some time been frequented by a half dozen of these interesting birds. We first discovered a pair on a small maple from which the sap was flowing freely from numerous round cups about one-fourth of an inch in diameter. The female flew on our approach while the male hopped up the trunk to get out of reach but upon our stopping returned to the sap cups. "Woodpeckers," said my friend on first seeing them. "Sapsuckers," I replied, "Look at the sap running down the tree." We approached gradually, now walking, now standing still, until we were but a few feet from the tree. Each time we walked the bird invariably hopped up the tree only to return as soon as we stood still.

A few days later I stationed myself near a tree which seemed to be a favorite because of the frequent visits made by the birds to it. The birds on it flew off only to return after a visit to a couple of less favored trees. They uttered sharp notes which sounded like "cleu" which were long drawn out and quite clearly indicated that I was considered an intruder. After considerable scolding the female flew off but the male evidently decided to continue feeding on the sap in spite of me. He stopped between drinks of sap to look long and carefully at me, occasionally showing his resentment at my nearness by his shrill cries. In due time he visited all the tiny cups, several times holding his bill lengthwise the trunk in order to get at the sap in some nook to

better advantage. At times he hopped sidewise visiting many holes that were arranged in horizontal rows and then calmly dropped himself four or five feet to holes near the base of the trunk.

The feathers on his underparts were soiled by the sap which flowed down the trunk but his eyes were bright and when he looked at me as he frequently did he looked me straight in the eyes. The feathers on the crown are red and were occasionally raised in a small crest. The red on the throat showed to advantage and the border between the red and black could easily be traced from where I stood. The female differs from the male in having the red on the throat replaced by white. The bird is a dirty yellow underneath and from this it is named. The black and white bars running lengthwise the wings are conspicuous marks as are the white lines running through the eyes. Other white lines begin at the base of the bill and run along the sides of the throat and breast.

When not molested the birds were continually chasing each other, bobbing in and out among the trees, down into bushes, up and on again, eventually returning after each chase to the tree near which I had stood. The two followed each other up and around the trunk, drinking the sap and resting up for another spin through the trees and bushes. At times both were drinking from cups in the same horizontal row.

Some of these horizontal rows contained twenty or more cups, in one case the trunk being completely girdled save for the small spaces between cups. The fact that the holes have these spaces between them saves the lives of the trees and materially reduces the damage done by the birds. I found the bark of many trees filled with former and now healed holes, the trees seeming none the worse for the sprees which sapsuckers had had at their expense during former years. I saw scores of trees with a few fresh holes but numerous healed ones which were gradually becoming smaller and smaller each year. Where a few holes are added each year it soon makes quite a showing but results in no harm to the tree. There were no dead trees in the grove and hence none could have been killed by the birds. No doubt a few weak ones are killed each year but to balance this the bird has to his credit large numbers of harmful insects destroyed.

According to my observations Neltje Blanchan was right when she said: "But it must be admitted that rarely does the sapsucker girdle a tree with holes enough to sap away its life. He may have an orgy of intemperance once in a while, but much should be forgiven an erring one as dexterous as a flycatcher in taking insects on the wing and with a hearty appetite for pests." So was Chester A. Reed in saying: "This species has gained some ill-repute because of its supposed habit of boring through the bark of trees in order to get at the sap, and thus killing the trees. However, I very much doubt if they do any appreciable damage in this manner." Consequently we may hope that the reputation of the yellow-bellied sapsucker will become better and better as the years go by.

1922 YOSEMITE NATIONAL PARK NATURE GUIDE SERVICE ITEMS

The germ of this nature guide movement in the national parks was similar work in the attractive scenic resorts among the Swiss Alps and along the Norwegian fjords, studies of which were made by the World Recreation Survey. The experiment commenced with lectures at Lake Tahoe resorts in 1919. There were also campfire talks, nature-study field excursions and motion pictures. The experiment proved unexpectedly successful. At Fallen Leaf Lake Auditorium not only was there no standing room, but visitors stood outside open doors and windows listening to the talks regarding the fascinating wild life of the Tahoe National Forest. Business men deserted trout fishing for mountain climbs and long distance hikes under a nature guide.

Director of National Parks Mather, then passing through Tahoe realized that such work could be expanded tremendously into the national parks of the country, and through his interest over 27,000 visitors in 1920, and some 50,000 in 1921 were given free nature guide service in Yosemite National Park.

Last year fifty-two lectures and campfire talks, and over a undred field trips were given, and there was a free wildflower show in Yosemite Village throughout the entire tourist season, as well as sleeping bag trips into the High Sierra back of Yosemite. The 1922 program will be on a still wider plan and will include lectures and field trips at the back country lodges.

Have you a Nature Hobby?

MARION D. WESTON (Ph.D.)

Georgetown, Mass.

Riding a Nature Hobby is an excellent way to have a good time out of-doors, not the only way of course for skating, swimming, base-ball and your other favorite sports all have their place. As hiking becomes more and more popular people are learning that the tramp with a definite goal of real interest to the hikers is enjoyed much more than the aimless ramble. The greater the number of things we enjoy doing out of doors the better. The boy or girl who is developing an intelligent interest in all phases of out door life is laying up untold stores of health and happiness for future years. If to this well-rounded interest is added an insatiable curiosity to learn all that there is to be known about some small field of Nature we have a game which many find the most interesting they have every played.

Some members of the Rhode Island Field Naturalists Club have selected Nature Hobbies which may appeal to you if you haven't yet a hobby of your own. Miss Josephine Bishop of the John Howland school writes:

STUDYING THE GRASSES

"Grass is so common we hardly notice it. Yet—have you ever thought how important grass is to our comfort and happiness? Do you realize that flour is made from a grass seed called wheat and the oatmeal we like for breakfast is another grass seed? Then too, what should we do for milk if there were no meadows full of grass for the cows. Think how dreary our walks and rides would be without the beautiful greens, reds, browns, yellows and purples of the grasses to brighten the way.

Some of our Rhode Island grasses are very beautiful and some most insignificant. There is quite a variety of form, size and color in the grass blossoms. One of the most beautiful is the Velvet grass, with its spreading head of red-purple flowers so soft and velvety to touch. One of the strangest looking is the Fox grass of the sand dunes with its blossoms like little sticks fastened to a stem. We have all sizes from the little Poa, the grass of our lawns, with its stem and blossom not two inches

tall to the Salt Marsh grass which grows over three feet tall and has a blossom eighteen inches long.

Grasses, like flowers, have long Latin names but most of them have a common name as well. Most people can identify ten different trees or wild flowers—Then why not ten different grasses. There are so many grasses common in the yards and fields and woody places of our state. Why not see how many you already know? Here are some very common ones to start with—the Poa, Timothy, Fox-tail, Finger-grass, Oats, Red Top, Couchgrass, Witch, Cockspur, Orchard and Beard also their cousins Pennsylvania Sedge, Yard Rush and Sand Mat. Within a quarter of a mile of my home I have found over thirty different varieties, and they are not all by any means. Maybe you can find more. Try it."

Wild Flower Garden

If you enjoy collecting things and have even a small garden spot you will find it most interesting to bring home wild plants from the woods and fields and try to make the little newcomers feel at home in your own yard. Mrs. Edgar C. Lakey has such a garden which has been giving her much pleasure for the last ten years. Living plants make charming souvenirs. Canada Violets blooming luxuriantly in her Providence garden remind Mrs. Lakey of a happy day spent on a mountain side 150 miles north of Montreal.

The Violets

Every Rhode Island child knows that the Violet is our State Flower but very few are familiar with the different kinds of Violets growing in our state. Miss Ida M. Arnold, secretary of the R. I. Field Naturalists Club, has selected the Violets as her hobby, realizing that this family is more complicated than most people suppose. There is a famous Botanist in Vermont, (whose grandson is attending our Rhode Island schools) who has been studying the Violets for many years and is now writing a book on this family with 80 beautifully colored illustrations. This spring Miss Arnold hopes to learn a great deal about Rhode Island Violets by comparing them with these pictures. She may even send some of the more troublesome ones to Dr. Brainerd himself.

It would be fine to have a number of boys and girls from different sections of the State become specialists in the Violet Family since that is the family to which our State Flower belongs.

A picture of the Henry Barnard school children on Violet Hill was taken one day when the slope was blue with Bird foot Violets. It does no harm to pick this kind of Violet for the plants themselves are not disturbed. They go on blooming all the more freely just as their garden cousin, the pansy, blossom better when the flowers are picked. Of course we must be very thoughtful in our hobbies for we want to encourage beautiful plants to make themselves at home in our state. A little study of the habits of the plants will often settle the question as to whether we may pick the flowers or merely carry away a picture of them. A Botany Teacher of mine once wrote of "Memory Pictures." They are a very good kind not dependent on all the puzzling factors which we must consider when taking camera pictures.

"Memory Pictures"

While we may pick Bird-foot Violets if we wish some flowers to carry home we would decide that pictures were best for the Yellow Violet whose single flower is borne on a leafy stem, as in the Canada Violet, so that if the flower is picked the entire plant is destroyed. Pictures form the only way to bring home many other flowers as well as Yellow Violets. Memory pictures of the pink Lady's Slipper are particularly lovely because the setting is usually so fine. The next time you find these orchids close your eyes for a few moments, try to recall the shape and color of the flowers and the dark, woodsy background. Open your eyes and see if your picture was accurate, is it as clear as you would like to have it? If you have taken a good picture you will have something to carry home far more beautiful than the drooping, unhappy-looking flowers which lose so much of their charm when taken from their own beautiful setting. Mr. Albert E. Lownes has used the camera very successfully in his study of the Orchids as you will see by his picture of the Purple Fringed Orchids. He describes his hobby as follows:

Orchid Hunting

How would you like to have a hobby which would take you far away from city streets into the deepest woods,—a hobby which would offer unsolved problems for you to work out and new discoveries for you to make? That is what orchid-hunting means to me. Few of our plants have been so thoroughly studied as our New England orchids, and few of them can present so many unanswered questions.

It was my good luck, a few years ago, to make the acquaintance of one of the rarest of them. I was at a boys' camp in New Hampshire at the time. One day I found a plant new to me, and on looking it up in the flower guides I found it called "rare." That aroused my interest. I began to keep my eyes open, and in a few days I had located almost ten thousand plants of this "rare species." I mentioned the fact to a botanist I knew and he asked me to "write up" what I had seen for a scientific paper. My first article was short,—just a few words telling that I had found the Nodding Pogonia. Inside of a few days I had letters from a number of nature students asking for particulars. I was stumped, for I hadn't noticed much. That set me thinking. Here were men who had devoted years to the study of plants asking me, a boy still in short trousers, for information. The next year I made the best of my opportunity, and by the next winter I could answer some questions in regard to the Nodding Pogonia. But questions kept coming. How does it grow? What color are the flowers? What insects visit it? Have you ever looked at the roots? Manifestly, I had much to learn. In order to really understand this one plant, I had to know its relatives. Then one day I received a telegram from a well-known amateur botanist:

"Arrive Squam Lake 6:55 to-morrow night. Expect you to show me *Habenaria fimbriata*." I gasped. Habenaria fimbriata, the wonderful large purple-fringed orchid, grew somewhere near Squam Lake. That much I knew. It would not do for me to disappoint the botanist after he had made the long day's trip from Boston and it was too late to stop him. Plainly it was up to me to find the plant. That afternoon I slung my collecting-case on my back and started for Crystal Peak, for I had heard that the plants might be found there. For several hours

Photo by Albert E. Lownes

Purple Fringed Orchis

I searched the side of the mountain, delving vainly in this swamp or following the brooks. Then suddenly on my way home I stopped to look into a last little swamp. And there, in all its beauty stood plant after plant of the Purple-fringed Orchid. Next day the botanist arrived. He seemed a little suprised to find a boy in short pants instead of the man he believed he was to meet, and at first he queried me sharply as to whether I could show him the plant he wanted. I apparently convinced him I could, and since that day, the botanist and I have been fast friends.

It has been my joy on other occasions to locate new and rare plants. Often when one least expects it, some new or rare species will be discovered. Three years ago my chum and I had spent the day photographing the purple-fringed orchid. Toward evening we started for home, tired and happy. Suddenly I gave a shout of joy. The slanting rays of the sun filtering through the leaves had caught on a tiny spike of greenish blossoms: and there, nestling beneath the dead leaves, we found our first specimen of the White Adder's Mouth. I rigged up the camera, while Hank, my chum, got down on hands and knees for further exploration. "Where there's one, there must be two," he argued. But luck was not with him, search as he might, he could find no other specimens. He was just about to give up the search, when two tiny green leaves caught his eye, and a second new species was added to our list, Loesel's Twayblade.

Other discoveries have only been the result of long and patient watching. We were asked one time to find out what insects visited the Nodding Pogonia. For hours at a time we sat watching the plant, and never a bug did we see. Then one day, just as I was seating myself for a long afternoon's watch, a little ant-like bee came and entered a blossom. When he had probed its innermost depths, he backed out, carrying the sticky pollen mass with him. Heavily he flew to another blossom, and for the first time the fertilizing insect of this species was discovered.

That is the fun of orchid-hunting. One is brought into the woods and swamps, often to places where the foot of man has never before been placed. On every trip one may make some new and unexpected find, and while one often returns home

tired and dusty and disappointed, there is always the satisfaction which follows a day in the open."

Some plants take care of themselves so very efficiently that we may pick them freely without fear that they will be exterminated. This is especially true of the Composite Family which is one of the largest as well as most successful of all the Plant Kingdom. The aggressive Dandelion persists in growing on our lawns; the White Daisy, a most attractive sinner, is the farmers' despair; Dahlias, Asters and Cosmos are some of our many garden friends belonging to this family which holds first place among plants. There are enough fascinating but tangled problems among the Composites to supply hundreds of people with hobbies. Miss Lila Hirley of the East Manning Street School writes:

"My interest in the Prenanthes or the Rattlesnake-root group of wild flowers, started last summer when friends referred a very young specimen of Prenanthes trifoliata, without flowers, to me for identification. I could not name it at the time, nor could some much more experienced botanists with whom I consulted. This plant varies greatly in appearance at different stages of its growth. Its leaves have a wide variation in shape, size and margin. Its clusters of pendulous flowers, too, show much variation. Perhaps this is why it was confused, until recently, in botanical text-books, with its near relative, Lion's Foot (Prenanthes serpentaria) and, by the novice, with Wild Lettuce another near relative. An expert botanist, with whom I was collecting one day, recognized a species not before recorded for Rhode Island, Prenanthes altissima. This occurence added to my interest and set me scouting for the third species, Lion's Foot, which through errors in identification in previous years, was considered common, but which really is rare. Thus far it has eluded my search.

In my hunt for specimens of this group last summer I was assisted by a girl just out of grammar school who shared my interest. We agreed to continue the study next summer, incidentally making a more general flower collection. We shall diligently seek the print of the lion's foot in 1921, following the trail to his lair."

Ferns

There are many attractive hobbies to be found among the plants which have no flowers. Miss Amey A. Lillibridge, who is the Fern Specialist of the Field Naturalists Club, tells of her interest in the study of ferns:

"I first became interested in the study of ferns while on a vacation spent a number of years ago on a farm in the foot hills of the Berkshires in western Massachusetts. I have always known a number of varieties of ferns by name, as Brake, Christmas and Maidenhair but I did not know the very common kinds that we see everywhere.

On our first walk to the village we saw several large plants of the Maidenhair Fern growing by the side of the road; other varieties of ferns were very numerous also. Upon speaking of having seen the Maidenhair Fern, upon our return to the house, we were told that a teacher who was interested in the collection and identification of ferns had spent her vacation at the farm a few summers before and had left the collection of ferns, which she had pressed between the pages of newspapers.

This collection was shown us and a fern book from the village library. I think it was "How to Know the Ferns" by Mrs. Parsons. After we had studied these, on our next walk we were quite pleased to identify the Sensitive, Royal, Interrupted and Cinnamon varieties. Upon walking in another direction through the woods we came upon a rock covered with the Polypody and a little farther the Christmas Fern.

One day a small boy from the next farm house came over to call, as he did nearly every day, and brought a stiff, dark brown frond of a fern that looked as if it were all dried up. It was about seven inches in length. We asked him what it was and where he found it. He told us it was the fruiting frond of the Ostrich Fern and that it grew next to the wall at the foot of the lawn in front of the house. We at once went out to see it and found a row of the Ostrich Fern growing up close to the wall at the edge of the little brook that had come down through from the cow pasture.

We were asked if we had ever seen the Walking Fern and upon replying that we had not were told that it grew up in the cow

pasture and they would show it to us soon. A few days later we were taken to the place where it grew on the slanting top of a good-sized rock in the woods near the brook. The top of the rock was covered thick with the rank growth of the fern. I was given a plant to take home with me which lived until another season and put out new fronds but did not form new plants and walk. It soon after died much to my regret. The brook in the cow pasture flowed through a little ravine on the sides of which we found many little maidenhairs and ebony spleenworts growing.

When my vacation was over I had learned at least twelve varieties of ferns. Upon my return I secured several fern books and have gradually added more ferns to my list until I now have identified very nearly forty varieties."

Miss Lillibridge has made a beautiful collection of ferns which may be seen at the Roger Williams Park Museum.

Mr. H. Emerson Heyer writes on:

Trees as a Hobby

"To beginners in the Book of Nature—and the wisest scientists are hardly more than that — the study of trees offers unusual allurements. Like the poor, we have them always with us: but, unlike the poor, they shed beneficence throughout the community, asking nothing in return but a chance to lift their leafy tops into God's fresh air and sunshine, and to send their roots deep down into the cuticle of Mother Earth in quest of food and anchorage.

Thus the trees are goodly folk to know: but how can we say we really know them unless we know their names? Here we are indeed fortunate if we choose trees rather than wild flowers or grasses or, worst of all, insects for our hobby, for while the species in some of these other lines are numbered in the hundreds, even in the thousands, and christened, in many instances with nothing but an awesome Latin name, the trees we shall meet in Rhode Island comprise rather less than one hundred and fifty species, every one bearing a pronounceable common name.

And their identification is comparatively easy, in most cases. To be sure there are some puzzlers among the oaks, and scientists will wrangle for years to come over certain fine points of difference among the willows and the thorns: but we need not concern ourselves with these. We need only to familiarize ourselves

with the trees concerning whose names there is no dispute to feel that we have greatly enlarged the circle of our friendships, for one must be unbelievably blind to study trees merely as insensate things. They are, rather, living organisms, developing with the passage of years marked individualities of growth; but maintaining ever the strong characteristics of their respective families and, as we meet them, and come to know them as we know our human friends, we shall find them scarcely less capable of sympathy, companionship and love."

Shrubs

Rhode Island shrubs offer fascinating fields for exploration for the more adventuresome. Why should trees be so generally known and shrubs almost completely neglected? Mr. William F. Janes is making a study of the Dogwoods or Cornels. One member of this group, I shall have to admit, is altogether too well known for its own safety, the Flowering Dogwood. Vandal hands bring great branches of the strikingly beautiful flower clusters into the city in the spring. Acquaintance with it is only for a few weeks in the year, however, for comparatively few people know the crimson, elongated berries of Mr. Janes' photograph. Still fewer know the tree in its winter condition with long pointed leaf buds and rounded, shortened flower buds. Last fall photographs of berry-bearing branches of our native Cornels were made; with the coming of the spring Mr. Janes plans to complete his collection of the shrubs in the flowering condition.

Tree Diseases

The trees are no exception to the sad but universal truth that all living things have their enemies. Foes of the trees are numerous indeed and claim our attention exactly in proportion to the value of the sufferers. Then, too, these marauders make interesting studies in themselves quite apart from their economic value. Miss Clara M. Chase has selected Tree Diseases as her hobby.

"In October 1919 Mr. William G. Vinal led a Rhode Island Field Naturalists trip to Pocasset Falls, subject "Tree Diseases." It was then I became interested in Fungi. Mr. Vinal made it

especially interesting by asking us to scout around and see how many kinds of Fungi we could find on trees, dead things and stumps and then bring them to him. Much to my surprise there were several different kinds and each had a name as Polyporus betulina, Irpex cinnamoneus, Chestnut blight disease and many with such long Latin names one could hardly see the specimen. Some had most beautiful colorings as rich orange on one side with soft greys on the other, also greys with black lines. In October 1920 a friend brought me from South County a most beautiful Polyporus sulphureus, an edible mushroom, I can't describe its beauty, I hope to be able to find one on some of the very instructive trips this coming season."

Medicinal Plants

When a busy physician takes time to pursue a Nature Hobby we may be sure he considers it well worth his while. Dr. Henry P. Lovewell writes:

"The first scientific study of medicinal plants indigenous to the United States was undertaken by Johann David Schopf in 1783. In pursuit of his studies he relates of having visited Rhode Island and Connecticut. We have found our State to be a very satisfactory hunting ground for the botanical collector; it has a varied topography and abounds in woods, meadows, swamps, bogs etc., and posesses a flora that is unique in many respects. There are at least three hundred plants native to this state that have in the past been credited with some medicinal value, although the true worth of a large number of these is doubtful.

For ages past the laity have dabbled extensively in roots and herbs, using home-made decoctions and infusions for the alleviation of their ills. We would advise the amateur herbalist to study more carefully the varieties collected, as mistakes of a serious nature have been made.

The medicinal uses of many of our native plants have descended from the aborigines. In "Father Smith's Indian Dispensatory," we find mentioned Wild Ipecac, Culvers' Root, Butternut, "Nine-Bark Root," Agrimony, Horse-balm, Bark of White Pine etc., the leaves of Horse-balm were commonly used to create a sweat and as a local application to boils and swellings. The number of

plants that were used to destroy the venom of poisonous snakes is quite formidable.

The Dogs-tooth Violet or Adder's Tongue, in full doses of the root was formerly used as an emetic. In two localities we have discovered quite large beds of this plant, altho in some of its former haunts it is getting very rare.

As regards the Gentian family, both the Fringed and the Closed species possess bitter principles, but in a less degree than the Official variety, the Yellow Gentian, which is imported from Southern Europe. Several varieties of Sabbatia were formerly used in Intermittant Fever, sometimes with curative effect. Another member of this family is the Buckbean, a rather attractive plant when in blossom and possessing the bitter tonic properties common to this order; also used as a laxative, the rhizome and leaves contain the active principle.

The spotted Geranium or Wild Cranesbill, with its pale purple petals, has been justly considered one of our best indigenous astringents. The rhizome has a considerable percentage of both tannic and gallic acids. Bugle-weed was highly valued by Solomon Drown, M. D., one of the early preceptors in Botany at Brown University. Drown was deservedly celebrated for his scientific and practical knowledge of the medicinal plants of this country. The traces of his old-time garden of medicinal species are still in evidence at Mt. Hygeia, in North Foster.

In our tramps in early spring the Cornels or Flowering-dogwoods are of much interest, and the more so when we learn they possess an active principle cornine, an alkaloid having properties similar to quinine and much used by Southerners during the Civil War as a remedy in Malaria. The Bloodroots are among the most attractive of our early Spring flowers, and they contain an alkaloid of use in certain respiratory diseases. Often in company with the Bloodroot you will find the Spice or Benzoin Bush; although this is not the Benzoin of Commerce. Yet it has been used in febrile affections by making an infusion of the Bark, and its fruit has been used as a substitute for allspice.

Wild Senna, with its yellow petals and chocolate colored anthers is an interesting plant and possesses laxative properties.

New Jersey Tea, although not common to any one locality, is of historical interest, and rather attractive when in blossom. We have never used it as a beverage.

When your walks lead in the direction of deserted farmhouses, if you explore the region of the old apple orchards, you may find a plant not native to the State, but set out years ago for its medical value: we allude to the Mandrake or May Apple. It has very large leaves and a fruit the size of a small lemon. The plant is quite hardy and seems to thrive in spite of neglect.

Of our native ferns the Marginal Shield Fern with its fruit dots arranged so close to the edge as to often appear to project over it, is of much value as a vermifuge. The Common Brake and also the Royal Fern contain astringent principles, although not commonly used.

The sporules of the Club Mosses furnish Lycopodium, this is an inflammable powder formerly used to dust on excoriated and irritated surfaces.

We must not forget our native trees and shrubs, many of them having medicinal uses; the bark of the Oak is a valuable astringent. The inner bark of the Butternut is a mild cathartic resembling rhubarb. The American Aspen or Poplar at one time had a reputation of being a tonic and stimulant. From the Pine family are derived resins which are much used as ingredients in plasters and cerates. The Hemlock bark is very astringent and is much used in tanning. It appears to have no special advantage over other common vegetable astringents. The American Yew we have not as yet discovered wild in this State, although it has been reported as located in certain sections. It is believed to have poisonous properties. The bark of the Winterberry sometimes called Black Alder, really a Holly, is decidedly bitter, and should be classed as an astringent. Witch Hazel or Hammamelis is well known and contains astringent principles. The Buckthorn, although native in Eurasia, is found here both cultivated and escaped. It is a powerful laxative. The species found in Rhode Island has been used by Veterinaries.

In pursuit of the medicinal plants of this State, it is first necessary to find if the species sought are native to this region. We have found Bennett's Flora of Rhode Island of decided help. The Providence Franklin Society are about to publish a revised

edition of this work. Provide yourself with topographical maps of the region you are to visit. A camera should add interest to these trips, but do not expect satisfactory pictures of plants taken when the wind is rated at sixty miles an hour."

"Why I Collect Beetles"

Hobbies abound in the realm of animal life as well as in the plant kingdom. Mr. Martin Bowe, who illustrated the recent Park Museum Bulletin on Beetles, writes of his hobby:

"Nature has much attraction for those who can imagine that, when God created life on this earth, He gave each individual plant or animal the power to enjoy this life, to protect it in a measure and to perpetuate it. Since we cannot create life we should not thoughtlessly destroy it. Every plant and creature exists for an ultimate purpose, of which we know little or nothing. We study Nature to find this purpose for species, group or branch.

Insects serve as food for birds, fishes, frogs, snakes and many other animals. Insects are scavangers, which remove quickly to the soil unsightly and unhealthy dung heaps, dead animals and dead vegetation. When certain kinds of insects get so numerous that they become a pest, injurious to our crops or trees they have to be held in check either by natural agencies, such as birds, fishes, frogs or if need be, by poisons etc. When I started to collect beetles I was quite young and it was more of a pastime. Now I may call it a study for the joy of the possession of a specimen is secondary to the joy of the knowledge of its existence in a certain locality, and its place in our own lives. I collect Rhode Island beetles only because I expect to be able to do it thoroughly in my spare time."

"How I Started to Collect Beetles"

"Over in Europe, when I went to school, in the month of May the boys used to play with May Beetles. We had baskets filled with linden leaves to keep them in and we used to barter them for others, for there are half a dozen varieties, a "king" or "queen" being considered a fair exchange for half a dozen "chimney sweepers." A May Beetle is about an inch long, has white saw-edge markings just below the brown wing covers, black chest and head, large eyes and fan-shaped feelers. Otherwise it looks like a big

Junebug. Later, when we were bigger and our radius of known territory around the city increased, we became acquainted with other beetles remarkable either for their size or their beauty and we started to preserve them. There was a stag beetle, three inches over all, with pincers half the length of the body. The fiery hunter which has been introduced into this country to fight the Gypsy Moth, the hero beetle, a longhorn two inches long with feelers longer than the body, the musk beetle with a strong musk odor and many others. A book with a key and competition among the boys kept interest in beetles alive until it became difficult to find new ones. All our specimens at that time were labelled only with their names. Now it is required that every label must give time and locality besides, which makes a collection of scientific value."

A Seashore Hobby

Seashore hobbies should be especially popular in Rhode Island. A study of the habits of our native fish may appeal to the boys more strongly than any work along the lines of plant life. Mr. Henry F. Mencke, treasurer of the Rhode Island Field Naturalists Club, writes:

"Spending my vacations at the seashore I have been interested in the strange sea creatures brought in by the fishermen. Large Horse mackerel weighing seven hundred pounds are the fellows that are built for speed, with their upper fins closing down in just like a jack knife, even more smoothly, and their side fins fitting into a depression, so that when they make that strong propeller tail of theirs go they can travel fast. They will sometimes rip the fishermen's nets through, allowing all the marketable fish to get away, and thus cause quite a loss. So also will the Whip Tail Shark who will thrash around with his long tail.

A Sturgeon weighing in the neighborhood of three hundred pounds is a profitable catch and is curious to see. His head and his large bony scales remind me of an alligator. A Porpoise the fishermen will generally let go, he belongs to the mammals. A Sun Fish weighing three hundred pounds is an odd looking fish with small and rather round mouth, large upper and lower fins and skin as rough as sand paper. The fish is about as deep as long with a large scalloped edge in place of a tail.

A visitor that will bear watching is a large Skate. He has a long rough tail at the beginning of which is a wicked spike which he can swing upwards and drive through a boot into one's flesh making a bad wound and causing blood-poisoning. A rare and lively little visitor is a Marbled Angler or Segasus Fish. The one I found was about the third recorded as taken from Rhode Island waters. His coloring is similar to that of kelp. His side fins resemble hands with the fingers frayed out like kelp. It is said that he will lie in wait among the kelp, which he so much resembles, and will dart out and attack a fish his own size. This one was only about three inches long and nearly as deep.

A Portuguese Man O'War is curious to see floating on the surface of the ocean blown by the wind with his nicely colored wind sac. He has long tentacles provided with stinging cells with which he reaches out to catch his food."

Camera Hunting

Albert E. Lownes

Have you ever gone hunting and tramped all day through woods and meadows hoping for a chance shot at some fleeting rabbit or squirrel? And when night came on, have you trudged home wearily with a heavy gun and an empty game bag? It's fun, isn't it, even though you haven't killed a thing. But have you ever tried hunting with a camera? That is sport indeed, and in addition you don't leave behind you a trail of blood and death. Many of you have cameras, I'm sure, and doubtless you bring them out on special occasions to take a picture of Uncle Ben or Baby Joe. But have you ever taken them with you into the country to take a picture of a deer or a robin? If you can do that, you deserve the Indian name of "Gitchi-Gaossed,"—Mighty Hunter.

The good camera-hunter needs every qualification of the big-game hunter. He must be clear-eyed, steady-handed, and quick to take advantage of a moment's opportunity. In addition he must have a double portion of patience and a will to overcome all obstacles. In return he gets a true love of the big out-doors and

trophies finer than those which grace the homes of the finest sportsmen. A good shot can drop a deer at well over a hundred yards, but the camera-hunter must get within twenty yards to get even a fair shot. Then, too, one learns to know the habits of birds and animals better than he can in almost any other way.

A couple of years ago I was out hunting with my camera. Far up in a tree-top a Scarlet Tanager was singing lustily. I whistled to him, and to my surprise he came down and perched a few feet from me. I approached quietly, until I was within six feet of him. He eyed me suspiciously as I opened the camera, and then just as I was about to "snap," over he hopped right on top of the camera. Of course I couldn't take his picture then. I reached up and carefully set him back on his perch, and once more he hopped back to the camera. A third time he repeated the performance, and it began to look as though he would refuse to pose. Then an idea struck me, and as I put him back on the branch, I began to whistle. Soon he forgot all about me and my little black box, He started to sing with all the vigor possible. Then I snapped his picture and in a few minutes off he flew.

Other times I have not been so fortunate. One day last summer I came on four splendid Rocky Mountain Sheep. They were down beside a tiny lake where they had come for salt and water. I crept up quietly until I was within twenty feet of them. Cautiously I felt back for my camera case and opened it. It was empty, for I had left my camera in camp.

Good pictures are occasionally the result of good luck, but more often they represent hard work and long patience. Almost any camera will do for wild life photography, although one using plates is best. I always like to think of the words of one of America's greatest nature photographers. "Good pictures," he told me, "are due 95% of the time to the man behind the camera." My advice is to know the capabilities of your camera,—and then use good judgment in using it. In any case, to have taken a good picture of a bird or animal (or even a plant) is an achievement to be proud of.

Spring-time Among the Trees

KATHERINE R. ROGERS

"Good-morning!" boomed Grandfather Oak one day when the Wind was blowing freshly from the South, "what tidings do you bring?"

"Greetings from the Southland to you Sir, and best wishes for your good health and a long life!"

"Ah, I've had that already," chuckled the Oak. "No living being remembers when I was an acorn! It's been very interesting to watch the generations come and go, and I don't feel any older now than I did a hundred years ago! Of course, I'm rather a cripple, but that doesn't matter, as long as I don't need to fly around like my friend the South Wind here! Having all these young Trees about me keeps me feeling young! I have lots of friends among the Birds too, and they tell me all sorts of nice stories when they stop to rest among my branches, on their way North in the Spring and when they start back for the South in the Fall. They're great chatterboxes, and I don't know whether to believe all their wonderful tales or not, but I enjoy them just the same."

Here the playful South Wind began teasing the young Trees, tickling their small branches till he had them all dancing and slapping at him, trying to catch him, and then he waved "Good-bye" and was off on his merry way.

"Thank goodness he's gone," sighed the tall Tulip trees. They were a typical New England pair, rather thin, and very quiet in their tastes and coloring. To be sure, they did put out plenty of flowers in the Summer, large ones, shaped like a Tulip, but very inconspicuous, being of a greenish yellow with tawny stripes, and the Orioles found nectar in their cups. They were nice, inoffensive Trees, and gave no trouble to any one, and they were so tall they could look over some of the others and see the fat little Pine tree down back of the House and the great Flowering Cherry standing in front of the Barn. So they called out in rather cool, clear tones to know how the little Pine had stood the Winter.

"Oh, nicely, thank you," said she, fluttering her soft clusters of needles a little. "It was not really dull, because I had all the Arbor Vitae Hedge for company, you know, and of course they harbor a great many of the Winter Birds, so there's plenty of conversation, and it's mighty lucky for the Birds that the Hedge has grown so thick and large. And you can't imagine how lovely those Evergreens look after each snowstorm, when they are covered with a thick white fleecy fall! It looks as if a lot of little downy clouds had settled down on them! Even our great Spruce that stands so like a sentinel, really looks handsome when he has that white great-coat on! And you should see yourselves with ice covering every branch and the Sun shining on you, if you want to be in Fairyland! Old Spruce sometimes condescends to talk too, but he's such a pessimist, with his drooping branches, that he rather puts a damper on any of our games. He's very deaf or I wouldn't venture to say this, as his feelings and temper are very prickly. He tells us he shelters the Birds too, and provides them with good cones to eat, which I must confess is more than I do yet, but he's not very agreeable socially, he's so stiff. Now I like those gay Larches, over across the street, they're so lively, and we send lots of messages back and forth by the Chickadees, who really make themselves very useful. Altogether, we've kept pretty good watch over the place while the Family were away and you were all resting, but I'm very glad that time is over! Now I shall soon have plenty to laugh at, watching the Birds splash about in their bath that our young Gentleman made for them, just below the well where the water can run in every time any one pumps. The Robins love that, and then they fly up on top of the Swing and prune themselves and chirp their loudest. That Swing is a great platform for orators and singers. When the Cat-bird isn't there, making things lively with his comical chatter, the Song-Sparrow takes a turn at it, and he is the sweetest singer of all!"

The Flowering Cherry now gave a pleasant laugh, and began to prepare the little double blossoms that she hung all over her head like white curls for the Spring Festival, in good seasons when she was feeling well. She was rather old and very portly, so she didn't always dress up, but when she did she made a very pretty picture. The children loved her because she was a

motherly old soul and was easy to climb, and they could sit and read by the hour among her branches, while she smiled agreeably on all around her. The Lilacs were her particular pets, and evidently the Family were fond of them too, for they were planted in groups here and there all over the Place, and in long lines to mark the north and south boundaries, and again to shut off the view of the Chicken-yard from the House.

"How do you *do*!" they shouted in chorus gleefully, struggling frantically to be the first in the race to burst their buds, in which they always succeeded! They were a cheerful lot, and kept the others in constant good humor, urging them on during the doubtful days of May, when it sometimes seemed too chilly to bloom, spreading their fresh, sweet perfume on the air, and getting the vagrant Breezes to carry their message far and near.

"Spring has come!" they said. "She may be a trifle fickle, and she likes to play tricks, but don't pay attention to her moods. When she hides, we just have a breathing-spell, and the minute she appears again, we take a fresh start, and the first thing she knows, we're all in bloom! It's like going in for a salt water swim, the first plunge is chilly, but after that it's glorious fun to play with the Waves! At least, that's what the Children tell us."

"That's all very well," said the Flowering Cherry, "when you're young and energetic, but when your body is all twisted like mine and the top of your head has been taken off ever so many times to make room for that plaguey West Wind to blow straight at the Wind-mill, you won't feel quite so much like giving advice!"

"Oh, nonsense, you dear old lady," said the cheerful Lilacs, "you know we're just as old as you are really, only we don't grow so large, and we belong to the old-fashioned Country People who are not easily discouraged and are used to hard work in every kind of weather, whereas you belong to the ornamental class and naturally have more leisurely ways. Now your first cousins the Red Cherries are splendid workers, and they are almost as quick at blossoming as we are! They do stain the Children's clothes most dreadfully later on, when their fruit is ripe, but that doesn't stop the Children any, you can't keep them away when Cherries are ripe!"

The Red Cherry trees all giggled and waved their branches. They loved the Lilacs' fun, though they didn't have much to say

themselves, but just kept busy getting ready for the early fruit they bore, with visions of happy summer-days and many Playmates floating before them.

"Heigh-ho!" yawned one of the little sleepy-head Peaches, the last to wake up. "I do hope it isn't going to be awfully cold, just when we get our best pink blossoms fully out! It's rather discouraging to do our best each year, and always run the risk of getting a bad chill and losing half our crop! People always treat us very well, and give us the finest place in the Garden, so we really like to make a good return when it's possible, and indeed it often makes us blush, to hear the praise they lavish on our fruit!"

The South Wind was hovering near, so he caressed them gently and said, "I'll remember that, and try to keep the Frost away from you. You're nice, modest little things, with your blushing fruit, and he has no business to nip you!" All this time, the Apple Orchard was making a tremendous racket, bursting its gorgeous buds and forging ahead to catch up with the Lilacs, and the Birds and the Bees were furnishing an orchestral accompaniment, and soon the whole country-side was smiling, in beautiful array, to welcome Spring.

NATURE STUDY CLUB OF PITTSBURGH

Bulletin No. VII. April 1922.

THE CIRCUS

(By Miss Millie Turner, Teacher of Nature-Study, Belmar School)

Come, visit with me this evening
When the sun has gone to rest
A most remarkable circus
'Tis surely the biggest and best.

There are dogs and bears and lions
And a bull with a fiery eye;
A scorpion, swan, and eagle,
At the circus in the sky.

There is Hydra, the famous serpent,
And Draco, the dragon bold,
A crab, a ram, and a rabbit
And a horse with wings of gold.

Orion, the famous hunter
And the shy twin boys will be there;
King Cepheus, the seven sisters,
And a queen in her golden chair.

So come to the all-star circus
There is never a penny to pay
And if you should chance to be thirsty,
You may drink from the Milky Way!

NATURE STUDY IN THE WOMAN'S CLUB ERIE, PENNSYLVANIA

From a small group of nature enthusiasts who had cultivated their taste for the out-of-doors by doing field-work together for several years, the Nature-Study Department of the Woman's Club of Erie was formed. Under their guidance there has grown up a large and interested group of people eager to learn of nature from whatever source available.

Indoor meetings are held with talks on various topics, mainly flowers, birds, and trees. But astronomy and geology contribute their share.

Out-door meetings give opportunity for actual experiences in the field, the chief delight of a true nature lover. Here each individual can be his own Columbus, discovering America.

Erie has a natural location affording good opportunities for study. Lake Erie, and the bay (five miles long by two miles wide) enclosed by the wild and densely wooded peninsula of Presque Isle, attract water and game birds. This seems to be a natural migration route for birds to and from Canada. The peninsula has many interesting botanical features and is often visited and studied by scientists from away.

The field trips are eagerly anticipated. Simplicity of arrangements contribute much to their popularity. Easily accessible places are chosen and each member provides her own lunch. General discussion of observations by all members as we are assembled for lunch makes the work interesting.

Our Nature Study Department is helping to foster a love for the vanishing species of wild life. We urge protection for future generations to enjoy. The results of the department's work are being felt more and more throughout the city. This is evidenced by the many bird boxes, bird baths and feeding stations seen, by fewer stray cats, by the cultivation of more flower gardens, and a wider interest in the preservation of the peninsula.

The following program shows the varied interests of members. Special mention should be made of the Round Table Discussions. The leader develops the topic and asks several members to talk on different phases; So that a larger number of people become interested. Every member is willing to help, although some might hesitate to attempt a large subject. In this way future leaders are developed, and at the same time a good deal of information is absorbed.

Subjects have for the most part been treated informally. Instruction and entertainment have been sought rather than deep scientific discussion. Our Round Table on Nature Books was one of our best programs. Everyone brought her favorite books for inspection by all.

LINA JENNINGS MOORE

NATURE STUDY PROGRAM
1921—1922

"In Nature's infinite book of secrecy a little I can read"
Shakespeare.

November 7 —Round Table, Vacation Experiences.
Leader, Miss Anna F. Shermin
Resume of the Game Laws.
Mrs. Mabel R. Hudson.
"Fiddlers of the Air." [Grasshoppers, Locusts etc].
Mrs. F. G. Andrews.

December 6 —Round Table, Nature Books.
Leader, Miss Charlotte Evans.
Study of a few Evergreen Trees.
Mrs. J. A. Evans.
Bird Neighbors in Winter.
Mrs. S. H. Drown.

January 3— Short Quotations from Nature Lovers.
Atmospheric Phenomena:
Clouds—
Mrs. C, F. Wilson.
Frost and Snow—
Mrs. R. C. Stevens.

February 7— Round Table—Winter Constellations.
Leader, Mrs. W. H. Lander.
Geological Formations of Erie County.
Mrs. E. J. Armstrong.

March 7— Round Table—How to Attract Birds to your Grounds.
Mrs. G. O. Moore.
Spiders—
Miss Marion Gunnison.

April 4— Round Table—Spring Arrivals.
Leader—Mrs. G. S. Ray.
Migrations of Birds.
Miss Emma Siegel.

May 2— Round Table—"Who's Who among the Wild Flowers."
Leader—Mrs. B. F. Sieger.
Insect Foes.
Miss J. R. Cleveland.

June 6— Picnic.

Note: Monthly Report on Stars—Miss Sherwin.
Selections from Nature Literature.
Mrs. T. O. Andrews.

THE
NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN ELEMENTARY SCHOOLS

Published monthly except June, July and August. Subscription price, including membership in the American Nature Study Society $1.50 per year (nine issues). Canadian postage 10 cents extra, foreign postage, 20 cents extra.

Editorial

Animal Amusements

The other day a ship came into the New York Harbor bringing to our shores, among other animals thirteen baby elephants and two baby hippos. They were a homesick, miserable lot as would any babies be taken away from their mothers, and they cried especially at night. Mr. Jurgen Johannsen who owned them was sympathetic and rigged up nursing bottles to pacify them and they soon looked upon him as a real friend. At Hamburg where they changed ships they took on eight "educated" dogs and to amuse the big babies the dogs were allowed to frolic among them and they were so amused by the antics of the dogs that when night came they were ready to go to sleep.

The most interesting animal book that we have seen for many a long day, Dr. Hornaday's "The Minds and Manners of Wild Animals" gives a chapter on animal play. From our own experience we know that animals need amusement—many of them are full of mischief just for the fun of it. I often see one of our chipmunks jump at a robin on the lawn just to see him hop. This is an interesting line for investigation. Why should not the Nature-Study Review publish next year a symposium on animal amusements consisting of notes made in the field this Summer where so many of us are camping or hiking, with our eyes open for this phase of animal mentality.

Dr. Hornaday declares with justice: "On the whole, the play of wild animals is a large field and no writer will exhaust it with one chapter. Very sincerely do we wish that at least one of the many romance writers who are so industriously inventing wild-animal blood-and-thunder stories would do more work with his eyes and less with his imagination."

News Items

MISSOURI

WEBSTER GROVES has an active Nature Club as the following bulletin shows. Real live nature-study with enthusiasm for the organization can be felt throughout the communication.

WEBSTER GROVES NATURE-STUDY SOCIETY MONTHLY BULLETIN

"SOMETHING DOING DURING MAY" (and April)

*On FRIDAY EVENING, MAY5th 1922, the regular monthly meeting will be held at the home of Mrs. Charles W. Martin, 400 Algonquin Place, corner of Rock Hill Road.

Dr. A. G. POHLMAN will lecture on "Embryology" illustrated with living specimens showing just what is happening within the eggshell during incubation.

Announcement will be made at this meeting of a date to be set for an afternoon and evening out-door basket lunch meeting on the lawn of Miss Mildred Allen, 25 South Plant Avenue.

Announcement will also be made at this meeting (if bee conditions are right) for an afternoon at Mr. Robert A. Holekamp's home, 560 Garden Avenue, where Mr. Holekamp, as a bee-keeper, will show how he handles and cares for his bees.

*On SATURDAY, APRIL 29th *all day* the Society will conduct a Flower, Plant and Bulb Sale, and thru the courtesy of the Wielandy-Reller Motor Company, the sale will be held in their showroom, corner of Lockwood and Gore Avenues. This will be a splendid chance to get choice plants for the garden at reasonable prices. Tell your friends.

(Mrs. F. M. King, 111 Cedar Avenue, who has charge of the sale will be glad to hear from any one having plants, bulbs or cut flowers to donate.

* ON SATURDAY AFTERNOON, April 29th, members and friends are asked to join in a BOTANY FIELD TRIP HIKE, starting from the Frisco R.R. Station at Meramac Highlands at 4 o'clock and ending at the picturesque "Quarry" in time for Camp-fire Lunch.

* * * REGULAR MONTHLY GROUP MEETINGS * * *

for special nature-study.

BIRD GROUP will meet with Mrs. F. M. King, 111 East Cedar Avenue, Monday Evening May 1st, at 8 o'clock. The Bird Group wishes to announce regular early morning field trips for bird study every Thursday morning until the end of May. The second one leaves Elm Avenue and Frisco R.R. tracks at 6 o'clock Thursday April 27th. Other routes announced each week.

ASTRONOMY GROUP will meet with Miss Anne Jones, 690 Bonita Ave. Monday Evening May 8th, at 8 o'clock.

TREE GROUP will meet with Mrs. H.A. Wegener, 119 Waverly Place, Monday Evening May 15th at 8 o'clock.

ENTOMOLOGY GROUP will meet at the U. S. Entomological Laboratory 628 Yeddo Avenue, Monday Evening May 22d, at 8 o'cl.

********** **********

HANG THIS UP IN A HANDY PLACE—SO YOU'LL KEEP THE DATES IN MIND.
Any information desired will be furnished by the Secretary,
Phone Webster 833 J

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MRS. JASPER BLACKBURN, PRESIDENT

MRS. ANNE A. JONES, SECRETARY

OHIO

CLEVELAND

The Museum of Natural History has issued the first of a series of popular interpretations of nature entitled "Trees of Ohio," by Harold L. Madison curator of Education. This is called "Pocket Nature History No.1, Botanical Series No.1." It may be obtained for 15 cents by application to the museum, and is certainly a most satisfactory little book. It may be carried in the pocket or in a notebook.

We shall all be debtors to the museum if it publishes these popular guides, according to its announced plan of issuing two numbers in each science each year, including the guides and the "intimate stories" of the sciences.

TOLEDO

The first field trip of the year for the Toledo Nature Study Club was held on March 5 on the Boy Scout Reservation ten miles from the city. Seventy persons were in attendance and enjoyed the observation of winter birds at the feeding stations, a hike thru the extensive woods of this camp-site, and a "bully" hunter's stew supper cooked by the Gimogash troop of Toledo Boy Scouts. The trip was under the direction of Prof. M. R. Van Cleve, supervisor of nature study in the Toledo schools and field director of the club. The Toledo club is one of the most active in the country, having a loyal membership of one hundred and fifty.

YOUNGSTOWN

The Youngstown, Ohio branch of the American Nature Study Society was organized on March 25, 1922 with the remarkable initial membership of seventy-five. This large gathering was largely due to the interest and initiative of Miss Elizabeth Northrup, teacher of science in the Grant Junior High School, now secretary of the organization. Supt. of schools Mr. O. L. Reid was elected president. Supt. Reid is strongly in favor of instruction in nature-study for school children and established such a department in the school of Louisville, Kentucky when he was city supt. of schools in that city. An influential member of this new club is Mr. George L. Fordyce a prominent business man of Youngstown and one of the best known ornithologists in the state.

The Youngstown area is in one of the best migration routes in Ohio. This fact and the fact that it is an interesting geological region, give promise of the functioning in Youngstown of one of the most active and useful nature clubs in the country.

PENNSYLVANIA

ERIE. *Woman's Club*: At the meeting of the Nature Study Department of the Woman's Club on May 2d, enthusiasm ran so high that although the program started at 2:30, it was 6 o'clock before we dismissed, and even then we were hardly satisfied. A communication was read from the Pennsylvania department of Forestry relating to Gifford Pinchot's great work of trying to restore the forests of this state, placing Pennsylvania back where she belongs—at the head of all states in Forestry. When we heard once more that these forests are now a "desert" and that it is from them that the state school fund is derived, we felt that "thereby hangs a tale." An illuminating talk on insects, chief emphasis on the housefly, made us all anxious to swat. And the Round Table on Wild Flowers made us glad once more that we live in this rich region. We know that on the peninsula alone there are over ninety species found nowhere else in the state, and that as a whole we have a greater number of species than almost any other locality in the country.

Opportunity was given for individuals to become members of *The Wild Flower League* of America, in the Pennsylvania Division, and one of our members will accept the position of chairman for Erie county. We shall endeavor to enlist the support of the Parent-Teachers Associations.

The recent lecture of Professor Dallas Lores Sharp on "The Magical Chance," brought by the Nature Study Department, was an inspiration which we were glad to be able to put before the whole 700 members of the Erie Woman's Club.

Boy Scouts

Here is a specimen of an Erie Boy Scout Hike which is a nature excursion, and boy nature predominates:

REPORT OF HIKE UP THE PENINSULA

On April 23, Troop No. 5 took its third hike this year up the peninsula. Sixteen Scouts met at the Merry-go-round at Waldameer at about 11 o'clock and then hiked up the beach. We noticed sea gulls, robins, song and English sparrows, blackbirds, downy woodpeckers and thrushes. We saw others which could not be identified. We noticed mattresses and chairs and other things the storm had blown along the beach. A Spadacene won the prize for building the first fire. Chas. Mehler passed first-class cooking and Robert Smith, merit badge in cooking. After dinner a seven-inning game of baseball was played. Landers "No Runs" beating Spadacene's "Hit Em Hards" 22-21. Spadacene could not find his axe when we started for home at 4:30 o'clock. Let's have another hike soon.

ALBERT VIAU
Reporter for hike.

Schools: A University Extension Course in Nature-Study was offered and maintained during the last term for the teachers of Erie under the instruction of Miss Elizabeth Carr. The lectures, museum work, and excursions were thoroughly enjoyed and most profitable. The increased teaching ability of the teachers who took the course will be recognized by increase of salary for all who entered and were successful.

Erie Public Museum:

Good work in Nature-Study is being done under the able management of Mrs Katharine Blake. Lectures on nature subjects and excursions to the woods are maintained, in addition to distribution of collections for nature classes in the schools. The teachers turn to the museum for help. The splendid bird houses and feeding boxes made by Mr. Liebel and kept in the museum until needed are an inspiration to many people and certainly help Erie to become a better home for birds.

NORTH EAST has maintained a successful nature club for many years, the activities of which have been carefully chronicled each week in the *North East Breeze and Advertiser*, by Mr. Cushman, leader of the club. This has done a great deal for the town and the county and is often the only breath of the out-of-doors that creeps into our newspapers. It has had an elevating influence not be forgotten. North East is now known as the home of nature-lovers.

The following topics were discussed: The Butcher Bird, The Hepatica, Food from WildPlants, Primroses Poisonous, Wild Ducks, A Hint to Anglers, Christmas Roses, Feeding the Cardinals.

PITTSBURGH has had a nature club for about 3 years with a present membership of about 150, "the best crowd in Pittsburgh." Miss Marie Knauz is now president. The best thing of the past year has been the building of a shack in the mountains 60 miles away. We will tell more of this shack later. Mimeographed monthly bulletins are distributed to all members of which a sample: may be found on page 198.

Bird Stories by Edith M. Patch, 212 pp with illustrations by Robert J. Sim. The *Atlantic Monthly Press.*

This is another volume of the series Little Gateways to Science and surely no hand has more magic in unlatching the little gateways than does that of Edith Patch. These bird stories are as interesting and delightful as the Hexapod Stories which have become dear to so many children. Miss Patch understands the child mind and therefore knows that the child is interested in the story of one creature rather than in any general descriptions of the habits of the species. Each one of these stories is a thrilling biography of a bird telling its home life, its nestling and birdling days and its experience as a grownup. Moreover, the birds described are not those usually selected for children. With the exception of the chickadee the other stories deal with the lives unfamilar to children, of birds which they see but know comparatively little about. Miss Patch has followed her own happy plan for naming her stories: The Chickadee is Chick D. D.; The Five Worlds of Larie give the complete history of the seagull; Peter Piper is the biography of a sand piper; Gavia of Immer Lake tells of the loon; Eve and Petro are a pair of cliff swallows that have exciting experiences; Uncle Sam is the story of a bald eagle, our bird of freedom; Corbie is a fascinating tale of a tame crow that was reared and was the playmate of a Brown-eyed Boy and a Blue-eyed Girl; Ardea's Soldier is the snowy heron; The Flying Clown is a story of the night hawk that has taken up her abode on the roofs of city houses; The Lost Dove is the story of the passenger pigeon; Little Solomon Otus is the history of a screech owl. The book closes with the romance and wanderings of Bob, The Vagabond, our beloved bobolink.

No fairy story ever written is more absorbingly interesting to the child than any one of these stories which are true and teach the child many things besides giving him information. Miss

Patch is very adroit in her lessons on conservation of bird and plant life, but is none the less effective. The illustrations by Robert J. Sim are pen and ink drawings and are very true and attractive. The last pages of the volume are given to notes on the stories and references and a very valuable book list on birds which includes also bulletins and leaflets which gives the volume special value. It is a book which should be in the library of every child in America.

Human Geography J. Russell Smith, Ph. D. Professor of Economic Geography, Columbia University. Book 1, Peoples and Countries, 370 pp, illustrated. John C. Winston Company.

This volume is meant for fourth, fifth and sixth grades and is indeed a human geography. The editor of this magazine graduated from sixth grade many long years ago, but she read this volume at a sitting and found it as interesting as a novel; and when through, she experienced a new and delightful sensation of intimacy with this earthly ball that has upon its surface so many kinds of geography and climate and therefore also so many kinds of people living in such diverse ways and occupied with such diverse activities. Where does the Eskimo live? To answer this question there is given a delightful account of the Eskimo's snowhouse, his children, their clothing, their food, their fishing and their dogs. Where does the Bedouin live? To answer this is given a thrilling account of the life of Hakim, an Arab boy and incidentally the story of his tribe that pitch their tents and feed their flocks on the desert's edge. How all of the great industries of the world are carried on, where the raw material comes from and the manufactured material goes to are described in chapters that hold the attention from start to finish. Especial stress is put upon the industries of our own great country. Five hundred illustrations, each picture one that tells a story, add greatly to the beauty and usefulness of the book. All the maps are good and convincing; moreover, an explanation is given as to how maps are made. We confess that we lingered long over some colored pictures of our earth as seen by the man in the moon. They will do much to counteract certain assertions recently made by supposedly intelligent people that the earth is flat. We hope that every fourth to sixth grader in our great land will have the

opportunity to study this geography and thus become really acquainted with our world. Volume 11 which we have not seen deals with Regions and Trade and is for the higher grades. We strongly recommend Volume 1 as a basis for world Nature-Study.

The Earth and Its Life. A. Waddington Seers, B. A. 208 pp. Illustrated. World Book Company.

This little volume gives an outlook on the history of the earth beginning back long before life appeared upon it and chronicling the appearence of plants and animals upon it as revealed in the study of geology and paleontology. Especial attention is paid to the early history of man. The topics covered by the chapters are: the earth and the universe, how the crust of the earth was formed—the plan of the earth, the movements and fashioning of the crust, the coming of life, evolution, the evolution of plants, plants and their environment, evolution of animal life—the lower forms, backboned animals: fishes, amphibians; reptiles and birds, mammals, man, the early users of stone, the later users of stone, users of stone in modern times, the users of bronze, the iron age, man discovers the universe, man discovers the earth, and man and his environment.

This book is especially valuable to teachers for their own information since it gives what is known of the earth's history in brief, concise and interesting form. High school pupils will find it valuable for supplementary reading and it will prove to be a convenient and valuable book of reference in Nature Study libraries.

Gardening. An Elementary School Text Treating of the Science and Art of Vegetable Growing. A. B. Stout. Ph. D. Director of the Laboratories. N. Y. Botanical Gardens. New York City. 345 pp illustrated. World Book Company

This is an admirable volume written by a man of wide experience in gardening who has a perfect comprehension of what the children should know about gardening and how to interest them in it. It begins with the objectives and methods and reasons for learning gardening, then follow chapters on how plants live and grow, their food and their relation to the soil and water. Later chapters deal with planning of the garden, the time for

planting, the care of the different kinds of garden crops and finally are given short discussions of the diseases, insects that attack plants and an appendix which gives the tables for planting dates for all garden produce. There are many points of special excellence in this book. It is very clearly written. Each chapter is followed by questions which will help the pupil to understand the reasons for things and suggestions of things for them to do and observe that are directly related to the subject matter just discussed. Each chapter begins with a valuable quotation from some author that is both cogent and helpful. It is profusely illustrated with photographs of children carrying on garden work or of subjects directly related to the work and there are also many helpful diagrams. The outstanding characteristic of the book is that by just looking at it the reader is inspired with an overwhelming desire to start gardening at once.

The Flower Finder—George Lincoln Walton, M.D., Member of the New England Botanical Club. 394 pp. Profusely illustrated. J. B. Lippincott Company.

This is a new volume for identifying flowers which combines the advantages of tracing them out by color and also by structure. It begins with some helpful chapters upon leaves, their arrangement and flowers, their arrangement and parts; and a short discussion of the prominent flower families. Preceding the chapters on flowers of certain color are given charts that will aid in identifying the flower more readily and which incidentally call attention to the form of the plant. The last chapters are given to the identification of fruits by color. Each flower and each fruit is illustrated by graphic pen drawings by the author or by photographs or both, and there are several attractive colored plates. The book is bound in flexible covers and is thus especially adapted for field use. It is a beautiful book that will prove most useful to those who wish to know our common flowers. The descriptions are short but tell the chief characteristics of the plant and its habitat.

NATURE-STUDY REVIEW

Devoted to Elementary Science in The Schools

OFFICIAL ORGAN OF THE

American Nature-Study Society

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A LARGE NUMBER!

Not quite so many, but a goodly number of NATURE-STUDY and SCIENCE TEACHERS are this year, using the loose-leaf sheets from

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CAMP AND FIELD NOTEBOOK

in building their Nature-Study Notebook.

The sheets include FLOWER, LEAF, BIRD, EVERGREEN keys; BIRD, FISH, FLOWER AND TREE with parts named; lesson sheets for bird, tree, plant, animal, insect and fish observations. Outline Drawing of birds, animals, flowers, fish, and insects for color work. Sky maps. Note paper.

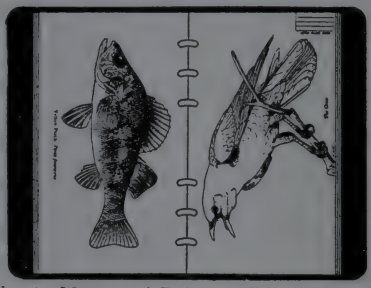

Fig. 1—Memo and Reference Book—Size of page $3\frac{3}{4}$x$6\frac{3}{4}$. Capacity 70 sheets.

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THE
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Children's Interest in Nature-Study

CLARA M. MCQUADE

State Teachers College, Chico, Calif.

"Science rests on a deep and primordial love of Nature in which it has its only real educational value." Howe. Ped. Sem. Oct. 04 p. 61.

If this statement is true it follows that the fostering and developping of that deep and primordial love is obviously the first step to be taken in the teaching of elementary science. Love of nature as well as all other love should be expressed through action and the plans made by any teacher for this early work should enlist the activity of the child in doing things that are worth while and that are so simple that his mind can grasp the reasonableness of them.

It is not yet known at what age the child begins to be interested in plants and animals but any mother will bear witness to the childs early delight in out-door life and just because the exact time of this awakening is not known, the mother is urged by a great student of child nature (Froebel—Intro. to M. P. p. 7) to keep the child out of doors as much as possible from its earliest infancy and to give it direct contact with as great a variety of natural objects as possible. This contact, he affirms needs only the sympathetic treatment of the mother, herself in love with nature, to cultivate in the child a like deep and abiding love.

But there's the rub. If mothers and primary teachers were themselves living in sympathetic contact with nature even though ignorant of "science" as such, it could not with truth be said as now that "almost all elementary science teaching is a failure." (Howe. Ped. Sem. Oct. 04. 66).

It is a sad fact that mere contact with the "fair silent things of nature" will not beget the sympathy as many a country bred man and woman can testify. Belated and conscious efforts of the individual toward the realization of that sympathy can result in mere *glimpses* of the beauty and the restfulness and the compensation of nature and a deep sense of misery at being cheated of a large part of his birthright.

Now, since this great loss can never be wholly made up to the individual later in his life by conscious effort on his part, let us as Froebel urges, be busy with the children.

About twelve years ago I was carrying a bouquet of sweet peas through a wretched quarter of San Francisco, a quarter then known as the "Dumps." On my way through this malodorous place I was stopped every few steps by children who begged for "just one" flower. It was pitiful to see the delight in their pinched dirty little faces as they received the flower. I asked what they intended to do with the flowers and the answer was always the same "keep um."

On another occasion in the same quarter of the city I saw two very small boys with stones in their hands creeping stealthily toward a corral, I asked them what they were creeping after, "boids" was the reply. I then inquired what they were going to do to the birds, "kill um," "then what" I asked. "Keep um" they answered. After that I worked for two years with those little waifs and have since had ten years experience in teaching little children and I find that gentle or simple they all want flowers, they all want "boids" and they all want to "keep um."

The problem then, is by no means hopeless though it must be confessed it often seems so.

It has needed but the mildest suggestion to start the children on journeys to trace lines of traveling ants to their homes, to stalk the birds and note their markings, size and song, to gather heaps of beautiful leaves and grasses, to watch with delight the fish, bees and butterflies. But always where this had been done came the blank wall and the question "what next?"

The work described in the following pages was started and notes were taken daily for the purpose of finding out by such a study (as much as possible) of the continuity of children's interests in such plants and animals as any school may have and to note their power of interpretation and their spontaneous reactions toward the work.

It will be noted in this paper that very little was done along the lines of the second topic while the first and third gave fairly satisfactory results as far as this particular group of children were concerned.

The time covered in making the daily observations was three months (Saturdays and Sundays omitted). A class of nine children averaging in age five and six years was chosen for the work. Of these six had attended kindergarten.

From the beginning great care was taken to leave the children as free as possible and at no time were any but very slight suggestions made by the teachers. Still it must be remembered that these suggestions, however mild, were no doubt partly responsible for the remarkable continuity of interest shown by the children.

The plan adopted was one that I had wished to try for a long time, and though it developed along unexpected lines in some respects, the divergence was due wholly to the initiative of the children themselves.

The work was begun in the early Autumn by taking the children on walks, stopping at favorable resting places and talking freely about the objects at hand. The main idea was to develop the desire for plants and pets but in the nature of the case many other subjects came up all helping, however, more or less directly in fostering the original plan. Grasshoppers were imprisoned by a fence made of clasped hands, humming birds were watched breathlessly as they gathered nectar from the flowers. Erroneous notions such as the belief that grasshoppers chew tobacco and that humming birds make honey were corrected by the older children.

In the course of a week the children knew that the gardener does not plant all the seed and that he does not go to the store to buy all that he does plant. The wind was kind and they discovered these things for themselves.

At the end of two weeks through the influence of talks, stories and delightful walks the children caught eagerly at the suggestion

that they plant some seeds and care for some pets. Various pets were suggested by the children, but they finally agreed on bantam chickens and white rabbits.

The gardener made us two small pens of wire netting with a hinged board on top. When finished they looked rather airy especially as the sky was threatening rain. This troubled the children and they thought of many devices for the protection of the pets. They suggested a new house, a cloth to spread on top, a shingled roof, but G— solved the problem by saying that he knew where there were some boxes in which holes could be cut for doors. His plan was adopted and the boxes provided.

The chickens were donated by the parents of one of the children. They were promptly named "Dolly Gray" and "Speckle." Speckle is a rooster but he submitted tamely to be named after the hen in the kindergarten story. But now difficulties arose. They had nothing for the chickens to eat, they couldn't find any rabbits and they "didn't know what rabbits eat anyhow."

The next day the children brought a goodly store of information to school. They knew all about the food of chickens and rabbits and one boy brought some parsley seed to raise some parsley for food. This was the very point I was waiting for. We now planted the flower seed previously gathered and set a pot aside for the rabbits, after planting parsley seed in it, many of the flower seeds were not the best choice for fall planting but the children wished to plant those they had gathered themselves. Among them were poppy, candy-tuft, sweet-peas and nasturtium seed, and it may be well to state here that the last named proved to be the most satisfactory in all ways.

While the seeds were coming up the problem of furnishing food for the pets was considered. The children proposed to bring food from home and for a few days "Dolly Gray" and "Speckle" fared sumptuously. Two children invested their pocket money for wheat and a fancy tin pan for a drinking vessel.

It was not long, however, until a day came when no food was brought. They asked how they would feel by noon if their mamas forgot to get their breakfast. They thought that they would feel rather hungry but were apparently not much cast down by their forgetfulness. On the way to the pen we came quite by accident upon some wheat scattered on the ground as though it beenhad spilled. Five children without a word dropped

on their knees and began to scrape the grain up with their hand' When asked why they were working in the dirt, they said "Here' wheat, we can carry it to the chickens." They made three trips to the pens before they were satisfied that their pets were sufficiently fed.

The next day six of the children brought rice, breakfast food, cucumbers, apples and buns and one boy filled the pockets of his trousers with wheat and vexed the souls of his teachers by leaving a trail of it after all his footsteps in the class-rooms and halls that morning.

This boy on a later occasion brought some sorrel for the rabbits but the hours in the school room were long and the temptation great so he ate it himself. When the children in their indignation told me of this sad occurrence I looked as sorry as I could under the circumstances as G— handed me three or four straggly roots and said eagerly "It was dus a leetle bit anyhow, Mrs. M—."

From this time on the children were very faithful in bringing food. They were reminded frequently of this necessity. Even the most careless child remembered sometimes and when he did remember his joy in the victory and in being permitted to feed the pets seemed to be greater than that of the more thoughtful children.

But even with all their care some would forget or mothers would refuse to be bothered and rations would fall short especially on Friday when three days meals must be provided. Here was another problem, what could be done to tide over the times of shortage? After a good deal of thought and a few suggestive questions the children decided to prepare and plant some gardens. In the meantime the search for rabbits was carried on vigorously by all hands but as yet with no results. But the desire for them only waxed stronger with every discouragement. D— said that she had a picture of a rabbit in her story book "and oh how I wish he were alive so we could have him" she said.

The market price for rabbits, it appeared from what the children told me was one dollar a pair. On my expressing my willingness to pay even more than that for a pair G— immediately began to organize a party to go up a "*big* canyon" and trap rabbits. The result of the expedition he generously offered me at the quoted market price. The other children speedily changed his views on high finance and he sheepishly offered to give me all the rabbits he could trap.

The time was still afar off when we were to have rabbits but this did not daunt the children. They talked of them constantly, and really helped all they knew to find some. Had I wished I might, of course, have come to the rescue but I thought it best to go on with the plant growing for a time at least.

From the moment that the seeds were planted in the flower pots and the children's names written on them the interest never flagged. When the time for this work came, the children ran instantly to their own pots, clasped them with both hands and gazed into them with anxious eyes. When they found the seeds sprouting they were full of delight and in a very short time they were interested in finding other sprouting seeds. They liked to give them to me and have me hold them while I recited:

"In the heart of a seed
Buried deep, so deep
A dear little plant
Lay fast asleep
Wake said the sunshine
And creep to the light," etc.

One morning A— dug up a large plant in a box near by. I was told of it and went to investigate. He said "I dug it up carefully I did't hurt it I just wanted to see if there was a seed at the root."

The children were uneasy when it rained lest the rain should wash their names from the pot and they would not know their own.

One day shortly after the plants had begun to grow we met a teacher who told us that she had put her pigeons temporarily in our rabbit pen. I expected nothing but that those beauties with their burnished necks, soft gray plumage and pretty pink feet would take the whole of the children's attention for that period, but quite to my surprise only three stopped to look at them until after they had examined and talked about their plants and even then the pigeons were quite secondary in interest to those tiny, insignificant sprouts.

The birds were shortly after this transferred to a pen built for them in a corner which the children must pass every day to get to their plants and chickens. They ran past, however, with scarcely a look at the pigeons. This surprised me very much as did also the fact that some chickens were hatched near our pens and though the children enjoyed watching them they did not neglect their own work in the least. They did, however, show the most intense desire for "Dolly Gray" to hatch some chickens

and their minds dwelt fondly on the thought that perhaps sometime they might have both baby chickens and baby rabbits and that they would be able to pet them and take care of them.

The children's evident lack of interest in the beautiful pigeons led me to try an experiment with them. I gathered them about the pigeon house and taught them a song and game connecting the pigeons with it. This they learned readily and seemed to enjoy. We sang the song and played the game three times and it had the effect of stimulating the children to a livlier interest in the pigeons, not enough, however, to interfere with their work with their own property.

Thereafter they often stopped voluntarily at the pigeon house long enough to sing "Coo-roo" and, when as sometimes happened the pigeons cooed in return it seemed to give the children much pleasure. By this time the plants were growing well and some of them were quite tall. It sometimes happened that rain prevented the children from seeing their plants, this always caused keen disappointment and I was always assured most earnestly that the children had worn their heavy coats "on purpose." It grieved me to turn a deaf ear to their pleadings and had the responsibility been wholly mine, I should have made plans to avoid any interruption of their work. But even after a short forced absence there was more delight than usual in the free time devoted to this work and in this case, too, it was such a surprising thing to see how the plants had grown in the meantime.

Several of the plants soon came to need support. As soon as the children noticed this two or three volunteered to make trellises but day after day passed and none forthcoming. At last I told a "story" about a plant that had an *owner*. This story was disguised pretty thoroughly, but one boy said after the usual pause "that story is about our plants." I made no reply and we started at our work. Four children immediately hunted about for sticks and used them to prop up their plants. Two of the four children also propped plants that did not belong to them. In a day or two E— brought a rude trellis which he had made at home. The others contented themselves with sticks for props.

A few chickens kept by the janitor for food were near our pens and about this time the children observed that they often overturned their drinking pan and were without water. A— asked permission to water them and after that it became a regular part of their work as long as the chickens were there.

Two boxes containing plants stood near our flower pots. These had probably served their purpose and were abandoned as they were almost buried in pine needles which had dropped from the trees. One day two boys carefully cleaned the pine needles from the boxes and loosened the earth around the plants "so they could grow better" they explained. This was entirely without suggestion. I had not noticed these plants.

By this time the desire for gardens had become very strong and although I wished very much to avoid planting gardens until we had first "caught our hare" it was getting late in the season and in order that other plans might not miscarry, we set about making the gardens. Two beds three by eight feet were marked off. The children did their very best in digging, hoeing and raking but they needed and obtained some help here. They had previously gathered lettuce seed from the school garden. One plot was planted with these while the other was called the farm and was planted to wheat for the chickens. In a few days the gardens were nice and green. The children were interested in them but were not so active in caring for them as their own potted plants. They were much quieter for some reason. They loved to stand and watch them, often stooping to examine the plants. They soon learned to distinguish the weeds but no effort was made to destroy them. The effects of sun and moisture were noted and some of them rightly interpreted though the very brightest girl interpreted the fact that the plant leaned toward the sun as something to be provided against for I found her protecting her plant from the sun by placing a thick board in front of it. This was long after the rest of the class had grasped the idea of turning their plants every day to make them grow straight.

One day while the plants in the garden were still very small footprints were discovered in the middle of the beds. This aroused great indignation in the children and I dreaded to let them work out this problem without any suggestion from me. The footprints annoyed them seriously and they thought of many ways to prevent any repetition of them. At last one boy suggested a sign telling intruders to keep away. This was eagerly seized upon as a good plan and just here was shown a very keen desire on the part of the children to write signs themselves which was of course the correct thing for them to do. The wish to write arose first by the children planning how they could make the signs,

then came an expression of the need for crayons so that their mothers could write the signs. I promptly supplied the crayons and as one little girl received hers she burst out with "Oh, Mrs. M— if I could *only* write I could make the sign myself." Unfortunately it was not possible for me to gratify the child's spontaneous desire to learn to write.

The next day this girl brought a sign made of paste board bearing in very large letters the terse command "Keep off." This was highly satisfactory to the rest of the class and we started for the gardens with a sense of great importance. Much advice was given as to the proper placing of the sign and different trials were made, but the reason for its final placing was supplied by a boy who said that it should be placed facing the back of the bed since the toes of the footprints were pointing forward.

The next day a boy brought another sign and by instruction of the children it was placed in the other bed facing the opposite direction in order that careless persons coming either way might be warned in time.

I did not understand the children's fascination for those beds, there was little to do in caring for them and with many hands that little was soon done. "Oh come along" said A— one day impatiently starting for the pens "those kids would stand and watch those gardens all day."

By the first of November the wish for a flower garden had become so strong that the importance of making one was urgedevery day. I did not wish to make one so late but their importunities finally prevailed and they were allowed to plan for a flower garden.

The ground was selected and seeds prepared but storms set in and other circumstances arose which prevented the carrying out of this plan.

D— our most interested little girl now left us and her sorrow at leaving was as great as ours at losing her. She left her plant for any little girl who might take her place as she was going too far to take it with her. She said that her mother had promised her that she might have a garden at the new home if possible. Our long looked for rabbits were obtained at last through A—. Two immense gray fellows who where instantly named "Roxy Bess" and "Tom." They did not object to being handled and this was a great point in their favor. It was such a treat to be allowed to get into the pen and let them eat from the hand.

For a time now the plants and chickens were of less interest than the rabbits but neither were neglected on that account. Such remarks as "let us go now and feed the chickens" and "we mustn't forget the plants because we like the rabbits" were quite common.

The need now arose for work that was quite necessary but less delightful, the cleanliness of the pets must be considered. The children were led to see the necessity for this by calling their attention to the lettuce beds which had developed an enormous capacity for raising weeds. The potted plants, too, needed weeding badly, but I had purposely avoided calling their attention to the fact. But now by a very few suggestive questions the children soon proposed to make all their belongings clean and neat. The pens were raked and swept and the pots and beds were weeded. The privilege of doing this work seemed to be sought as eagerly as any other.

One morning the children who had reached the pens first came running back with joyous cries to sieze my hands amd hurry me forward. The cause of the violent excitement displayed by these well-fed, well-cared for youngsters proved to be one tiny egg laid on the ground by our hen. "Dolly Gray" is *all right* shrieked G— joyfully. One would have thought that bantam's eggs were as rare as those of the roc.

I looked at the egg and said "Poor Dolly Gray" she had to lay the egg on the hard ground. That was enough. The next morning "Dolly Gray" could have chosen her nest from hay, clover, grass and excelsior.

The eggs accumulated slowly and it was a delightful thing to climb into the pen and hand them out when there were any. It was the great hope of the class that "Dolly Gray" would make up her mind that she wanted some baby chickens but, evidently she had no such notion.

In the meantime I was racking my brain to think of some fitting thing to do with the eggs. It seemed rather a tame proceeding to divide such precious eggs among the children for food but I could think of nothing better until D— with what to me seemed a stroke of genius suggested that we take them up town, sell them and buy food with the proceeds. "And then" she explained "when we forget we will have food here."

The children thought this an excellent plan and in due time we took the dozen eggs and went to the grocery store.

I had previously made a bargain with the grocer lest he should object to the size and age of the eggs. I felt that this was in no sense cheating the children as I could very truthfully say should anyone ask, that that particular dozen bantam's eggs was worth fully twenty-five cents to me.

The grocer offered to pay the children in silver or to trade for wheat. It was fully explained that they might take the silver and go elsewhere to purchase what they wished. But for some reason which I could not discover, they chose to trade.

M— pulled at my dress while we were looking at the wheat and whispered to ask me if I supposed "Dolly Gray" would care if we purchased five cents worth of vegetables for the rabbits, and as I thought that on such an occasion "Dolly Gray's" heart, however selfish, naturally would be moved to generosity, the trade resulted in two bags of wheat and one bunch of carrots.

The packages of wheat were heavy but all were more than eager to carry them. Each had his chance on the way to the pens and it was a very happy band of children who fed the animals that day.

This class was not in my charge very long after the trip above described. Though the tangible results of this little study are very meager, the work has seemed to me worth while since it has furnished a little further confirmation of the idea that has grown stronger with every year's experience in teaching young children, the idea that the study of science should have its foundation experiences of active and loving contact with nature without much attempt at finding the "reasons of things" except in so far as questions come up naturally in the course of the work. That these questions will come up there is no doubt and the teacher must be prepared to meet them and help the child to answer them.

That the interest of the children was kept active and continuous through their sense of ownership was demonstrated very fully.

I did not experiment so much with songs, stories and games as I should have done had I not from ample previous tests become fully convinced of their service in this work, neither did I feel the necessity of demonstrating how desirable freedom is for the beautiful unfolding of child life. The children were free, the work was carried on with no trace of formalism except such as was

necessary to secure orderly work and good discipline. The children were not allowed to run wild and perhaps this should be mentioned as having had a tendency to keep their minds engaged with the work at hand.

It is hardly necessary to point out the splendid opportunities of "correlation" which this work offered for reading, writing, singing, manual training, drawing and literature. The chances for observation of the life cycle of plant and animal, the stretching out of the interests of the children through harvesting and threshing their wheat, selling eggs and lettuce (with the worthy object of maintaining their pets on the proceeds).

I did not copy from my notes anything concerning the flowers of courtesy, helpfulness and unselfishness which showed weak and spasmodic signs of blooming but the signs were there and in abundance.

Finally it seems to me well worth while to take a little time from the formal work of the school to give the children that preparation, that foundation which must be given *now* if ever, which will open their eyes to the loveliness of common things and their hearts to the beauty and the high privilege, the highest that comes to any human being, that of nurturing life.

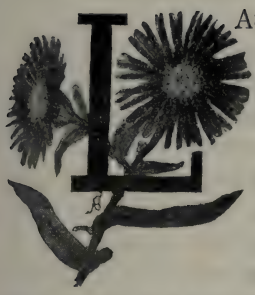
Ferns

When Zenith-high the sun of August burns,
How fresh and cool the frondage of the ferns!
Aisle upon waving aisle behold them stand,—
A forest shade for folk of Fairy-land.

—Clinton Scollard

Honey Flows

Alice Lee Sherwood



AST summer I was the excited owner of three colonies of bees and the same number of terrifyingly scientific bee books and a monthly magazine devoted to bees alone. Strangely enough, the word in these books and articles which most puzzled me was not at all a Greek or Latin name. It was the simple, expressive term "honey flow" repeated again and again, appearing in almost every discussion. So important a part did it seem to play that all of the bees' ways were influenced by it—the tendency to swarm, to raise or to cease raising brood, to banish the drones from their only home on earth, to rob one anothers' larders. According to the wise men who were guiding me my own dealings with the bees, also, seemed to depend on a thorough knowledge of the honey flows of my locality. Without such knowledge, said my books, I should never know when it was time to build up my colonies to the greatest possible strength. At the opening of a large honey flow my bees must be ready to send the largest possible army of workers into the field to gather nectar, they must have all the room they can use as the flow continues or they will swarm, and if the flow should suddenly stop I must be on the lookout for robber bees.

It sounded simple enough as I read until I would wonder, all of a sudden, what a honey flow might really be. The flowers bloom from the vanishing of the spring frosts until the frosts of autumn nights, and the bees work day in and day out as long as a flower anywhere holds up its beseeching head and beckons mutely to the passing bees, offering them with a smile the most fragrant wine if they will but carry a love message to some beckoning flower beyond.

It was a cold, rainy summer and both flowers and bees had to struggle hard to live. Problem upon problem presented itself to me as I watched my bees and studied my books, and before winter I had to supply the three colonies with many pounds of sugar which were almost impossible to procure. When the season

closed, I found that I had learned many things about bees but no *one* thing, no magic key with which I could unlock each secret door of my bees' strange world. And I kept repeating still, "What is a honey flow?"

In my bee journal there is a department called—"Gleaned by asking"—and many questions asked there by beginners even I could readily answer, but never did I see my question there asked by another perplexed beginner. It was too simple a term to be explained in my books. How stupid a pupil I was! I could not bring myself to publicly ask so foolish a question as this. If from these books of mine so complete in their explanations I could not "glean" the meaning of this constantly used term, no one could make me understand. Perhaps the bees would tell me if I watched and listened patiently and alertly enough. So I waited until the summer came again, and I have been rewarded—for I have shared in the jubilee of the bees at each successive honey flow this season and I hold a key that opens many doors revealing wonderful things.

Glancing over my record of the season these items appear:—

May 12—on—	warm, sunny days.
	apple and pear trees remarkably full of bloom.
June 1—	white clover opening.
	locust and a few tulip trees blooming.
June 7—	air fragrant with locust.
	vipers bugloss opening.
June 10—	hives full of locust honey.
June 12—	bees on alsike clover.
July 6—	sweet clover in full bloom.
July 10—	basswood blooming.
July 13—	sumac, stag horn, very full bloom—bees wildly excited.
July 17—on—	rain
	buckwheat opening.
	rain.
	robbing.
	heartsease blooming—no bees on blossoms.
July 26—	basswood gone.
	sumac nearly gone
	buckwheat and goldenrod blooming.
	rain.

August 1— Virginia creeper blooming—covered with bees.
August 9—on clematis, heartsease, sweet clover blooming.
rain, fog.
August 16— blue vervain, joepie weed in swamp—full bloom.
iron weed beginning.
a few white asters.
August 21— strong odor around hives.
golden rod in full bloom—bees working on it.
September 13—cold nights.
Sept. 16— asters in full bloom, all varieties.
goldenrod fading, iron weed gone.
Sept. 19— slight frost during night.
Sept. 20—on —bees excited by aster flow.
hot days bees in trees after propolis.
Sept. 26— A. M. thick fog, bees lost in air.
Sept. 27—on —equinoxial storm.
Oct. 3—on— cold nights.
Oct. 7— looked over colonies—loaded with aster honey, still raising brood.
Oct. 15—on— asters almost gone.
dead drones in front of hives.
bees mostly quieting down.

A year ago this would have had no meaning whatever to me. Now, how many joyous moments it recalls—what strange sights and sounds in a most mysterious world!

It would be impossible to tell of these things with a human tongue for who could understand or care? It is only when our ears are awakened to the music of the bees and our eyes are reading secrets in the smiles of flowers that our human minds or souls can catch here and there a fleeting insight, a revelation of great wonder and beauty in this world where there is no intellect other than nature's, perhaps, where perfect lives are lived without thought, without knowledge. Where and what is the conscious force that wills these things to come to pass among creatures so totally unconscious of what they do?

It was the thirteenth of July and the breath of July was in the air. The garden was gay with many colors and the fields glowing and smiling under the hot sun. I had noticed that for several days my bees had been flying in steady streams in one direction, but what they were finding so much to their liking I did not know.

In spite of my wishes and all my endeavors the bees had been swarming lately. "Who is our mistress, nature or you?" they seemed to laugh back at me as, in a rushing, singing cloud, they would rise and whirl and sail off to some tree top, leaving the hive where I had given them abundant room and ventilation and plenty of combs to build, with only the bees too young for the journey and those out in the fields and with pupae queens still sleeping in their sealed cells. To-day as I went into the garden the whole air was exulting with that well-known sound of thousands upon thousands of tiny, rushing wings. Over my head there was whirling a cloud of mad bees, and I "flew" as best I could to the apiary to see from which hive they were coming. To my dismay they were pouring from every hive! After the shock of that first sight of all my dear bees dashing off in one wild torrent to leave the homes I had tried to arrange just to their liking, I helplessly sat down near a hive to watch. "What!" I exclaimed, "Here are bees rushing in as well as out in an endless stream," They were not caught in the current of those leaving but were steadily entering the hive with loads of honey that made them fly heavily. This was not like a swarm and every hive, as I went about, had the same stream of returning bees. I caught at a new hope which was confirmed as I watched for some time and saw that the cloud grew neither less nor more dense but continued endlessly to sail off in one direction; the same direction, in fact, in which the bees had been flying lately. Such a mad, vast torrent of bees I had never seen nor heard, even when a great swarm would first rise into the air. As my eyes followed them my mind went flying off keeping pace with their swift flight, and away I went, presently, beneath the long straight cloud. How I wished for singing wings!

Being without them, my shortest way was not a "bee line" but a road which followed their general direction and led to uncultivated fields, and also to a wood where I knew some basswood trees grew. I went first to the wood and wandered about. The basswood was not blooming well. I heard one or two bees flying past and met another struggling among the leaves at my feet with wings so torn that she could never reach home again. But the feasting place I did not find here and I went down the road toward home. At a turn in the road I heard a flying bee and then another. They were going toward the wild fields which I had quite forgotten and I followed on their trail along a path which wound through fields of tall grass and weeds. On I went without seeing or hearing a bee anywhere. I came to a fork in the path and stopped, looking all about for some patch of clover or flying bees. There was nothing, and I started down one path when my collie, who had been silent all the while, barked and went the other way. It seemed like the wrong direction, but not being very hopeful of finding the bees at their feast that day, I followed the dog. The sun was blazing upon the dry field and the heat quivered in the intensely silent air. The paht led over a stone wall into a field which was bordered with dense bushes. On we went when suddenly I heard a sound in the heat and a rich, heavy, spicy fragrance filled the air. It was my children's voices I heard, I had come upon them at last in their play! This, indeed, was their feasting place. All along the wall were large clumps of staghorn sumac and such a mass of great soft yellow cones rising from banks of green I had never seen before. The air all about was quivering with bees in such ecstasy that I could but stand by and gaze at these my children with delight equal, perhaps, to their own. They were mad with the richly fragrant wine that filled the hundreds of dainty yellow cups arranged in smiling, nodding pyramids. Under the hot sun the nectar seemed to flow continuously, filling each cup as soon as it was drained, and the music of the bees at their feasting was of a beauty unbelievable. "So this is a honey flow," I cried as I walked on down the path. Soon I came upon a whole grove of blooming sumac reaching high above me, and along the little path that led through it I walked, enchanted, among the fragrance and music.

That evening after the last bees had come gliding in from the fields deserted by the sun I walked from hive to hive waiting for

the evening concert which I like so to hear. All at once, from the hive beside me, it began, that soft, rushing sound like the rythm of a distant sea,—that rapid fanning of a host of wings in perfect unison. When the work of the day is over the bees do not rest as we do for the nectar they have gathered must be ripened into thick golden honey, and with their tireless wings they fan the water from it at night. The music of their wings this evening was wonderful to hear, indeed. It cannot be imagined by those who have never heard it; for in our world of ceaseless discontent, of longing for something beyond, which we have not or do not know, there never is expressed such perfect, unclouded contentment as this music of the bees when the evening comes and finds them with combs all but overflowing with the fragrance they have been gathering under the sun. It recalls to me a certain philosopher's distinction between instinct and intellect which says that instinct is that which finds but which can never seek whereas intellect is always seeking but it can never find. If this is so, although the search is glorious, we must wonder in the presence of such music whether it is worth while.

White sweet clover.

This thirteen of July was the beginning of a continual search on my part to see what my children were up to. I soon learned to know whether a good honey flow was on or not, for when with the first warmth of the sun as it rose a bee would appear at her doorway, stand on tiptoe and then dart off in a straight line followed by a second, a third, a forth, I knew there was work for them to do. As their wings whirred past me they seemed to call back "follow, follow, follow!" and I did follow, and through their guidance I found and shared in their merry making. Often when I stopped at a hive in the heat of mid-day to watch the line of heavily

laden bees come gliding in, their wings would seem to sing in human words. The words were always the same, and it was when their burdens of nectar and pollen were heaviest that their wings sang most joyfully, "For my yoke is easy and my burden is light."

When the sumac flow was at its height under the hot, still sun of July the weather treacherously changed and violent thunder storms would suddenly rise and descend every afternoon. The air, which had been so pleasing to the sumac, was now kept cool and damp and agitated, while the yellow cones drooped and broke under the swift blows of the rain. At first, when these storms arose, when black clouds appeared in the west and leaped across the sky to the eastern mountains sending down to the hot earth strange, silent breath that was almost cold, the stream of outgoing bees would stop as suddenly as the storm arose. Through the hushed and darkening air a great stream of swift, silent bees would come gliding home to their various hives from the sumac fields. I, holding my breath too, would hope that they all might reach home before the clouds should crash. As if they knew how to gauge the time, there were usually only a few stragglers coming in by the time the rain actually fell.

As the rainy weather increased, the sumac bloom ended and the bees, who had been so excessively happy, grew irritable. There was no purpose evident now among their armies. Instead of flying straight for a nectar scource on wings that sang, some would go in different directions, some would hang lazily about the hives and some would dart about the entrance of a neighbor's hive trying to pass the sentinels and steal a load of honey. I missed the song of their wings as I went about placing tufts of grass smelling of kerosene oil at the entrances of colonies that showed any signs of being robbed and trying not to provoke the irritable creatures into stinging me. The remainder of the summer was unusually rainy and there were no glorious feasts laid out for the bees by the plants that waited for sunshine.

It was not until late September that the aster family opened its lavender-tinted blossoms in great profusion over all the meadows. Then, with intense excitement—as if they knew this was the last feast and when the asters were gone, unfriendly winter would do away with flowers—the bees streamed forth to gather every priceless drop they could. The prosperous asters had wisely waited until other flowers had closed their shops, and

now that they offered their wine in dainty cups of white and pink and lavender and blue, many were the creatures that came to sip. Among butterflies the monarch seemed the most noble guest, and there were various flies and wasps and bees. Most of these happy creatures were soon to die—their joy was only of the moment—but the honey bees whose wing-song filled the fragrant air were storing honey for hard times to come (unconsciously, no doubt). The honey they were making now would keep them alive and warm in their winter clusters. There was no thought of robbing while the aster flow continued. From sunrise until late in the night their swift wings sang of their joy in performing the work by which they live.

So I came to know a honey flow from the bees' view point as a time of plenty, when some morning they go forth and find the fields strewn with manna. It is the time when their hopes are highest and the queen and her 50,000 daughters work with all their energy while their hearts sing. No thought of past struggles nor of times to come, clouds their sky. When the night frosts came the asters willingly laid down their blossoms, for fertile seeds were plentiful in their ovules—thanks to the bees. My bees, after dragging out the now useless drones, settled down with subdued but contented humming to wait until maples and willows should bloom in the spring.

The Common Thistle

ROBERT SPARKS WALKER

I've traveled long, I've traveled far,
My army keeps me out of war!
From Europe years ago I hailed,
And not one effort mine has failed!

A standing one to four feet high,
I'm easy to identify;
My stem so stout that grows upright,
By country roads, in fields delight.

My narrow, white leaves, spiny grow,
Clasps hairy stems an inch or so,
With prickly wings with hairs on top,
And lower webby-woolly crop!

The flow'r envelope with spines,
My tube-shaped florets it confines;
A slender cluster all compact,
Keeps my magenta flow'r intact.

My fragrant flow'r with pollen white,
Three inches broad, a pleasant sight,
To butterflies and bumblebees,
Who often go on drunken sprees!

Now why so many spines? you ask;
And why I wear a prickly mask?
To beat the foes that me attack.
Else my species would go to rack!

June to September on stem ends,
My flowers meet both foes and friends;
"Now if you grab, I'll make you whistle!"
Is rule and law of Common Thistle!

Photo by G. H. Trafton
A Hermit Thrush at the Lunch Counter

The Thrushes

ETHEL H. HAUSMAN

Our slender graceful thrushes are birds of moderate size, larger than the English Sparrow, but smaller than the Robin. Their general coloration (excepting the two most familiar members of the family, the Robin and Bluebird) is brown above and white beneath, spotted with black or brown. The color of the back varies slightly in different species from a rich cinnamon brown to an olive grayish brown, and the number and distinctness of the spots on the breast is also subject to variation. As a rule there is little or no difference in color between the males and the females.

The most striking of the brown colored thrushes is undoubtedly the Wood Thrush or Wood Robin, so often seen in city parks and in the borders of deep woods. It is the handsomest of the family, I think, and without doubt the most useful from an economic point of view, for it consumes large numbers of injurious insects, and but very little fruit.

"He has a coat of cinnamon brown
The brightest on his head and crown,
A very low cut vest of white
That shines like satin in the light;

And on his breast a hundred spots,
As if he wore a veil with dots.
With movement quick and full of grace
The high bred manner of his race
A very prince of birds is he
Whose form it is a joy to see."

—*Garret Newkirk*

From the type of nest that the Wood Thrush builds it is quite evident that he must be in some way akin to the Robin, so very similar are the two structures. Family traits, even among birds often show in the various habits of the different related species. This particular abode is usually saddled on a horizontal limb, not far from the ground, and is composed of twigs, grasses, and bark (sometimes newspaper and cloth are used), carefully cemented together with mud and lined with grass, leaves, and fine rootlets. Nests are often found to which the builder has attached long streamers of paper, cloth, or string which hang from the outside and render the nest more conspicuous than it otherwise would be. Sometimes the papery, translucent cast off snake skins are also included in this outer fabric. Although as we have said, the nest resembles that of the Robin, it is, as a rule slightly deeper, and softer, for the Wood Thrush uses less mud than does his redbreasted cousin.

Within the nest are deposited three or four, and rarely five, rich dark blue eggs, resembling the Robin's, but smaller. Far away from the nest, among the echoing aisles of the wood the male makes the woods ring with his varied organ like song:

"And *music*—was there ever heard
A sweeter song from any bird?
Now clarion-like, so loud and clear
Now like a whisper low and near,
And now again with rhythmic swells
And tinkling harmony of bells
He seems to play accompaniment
Upon some harp-like instrument."

—*Garret Newkirk*

The Wilson's Thrush, more commonly called the Veery, is more uniformly subdued brown above, with the center of the throat white, but creamy buff on the sides and breast. The upper portion of the breast is lightly marked with wedge shaped

brownish points. This thrush is the slenderest and most graceful of all the members of this aristocratic family, and can be distinguished from them by the absence of any yellow about the eye, and from its faintly marked breast. The Veery is a shy bird and frequents the deep woods. It becomes doubly secretive during the nesting season.

The nest is carefully hidden in a clump of sprouts or ferns, a few inches from the ground, and its materials, bark and grasses, aid further in concealing it from view. The eggs which it is designed to protect are of a beautiful greenish blue, much like those of the Catbird.

That nature lover is unfortunate indeed who has not been thrilled by the ghostly, insinuating, dulcet rolling song of the Veery as he sings in the quiet hours of the morning or in the more solemn hours of the twilight, at which some especially happy individuals voice their joy!

Our thrushes are migratory birds, passing only a few of the summer months in our latitudes. The smallest, the Hermit Thrush, is the first to arrive and the last to depart, yet he is little seen during his long visit. He is not a difficult bird to recognize. The upper parts are olive brown, shading into a tail of pale, but conspicuous rufous. The throat, sides of the neck, and breast are pale buff. Dark brown arrow points tip the feathers of the throat and neck, and large rounded spots dot the breast. However the markings of the under parts are not as prominent as are those of the Wood Thrush.

When the nesting season arrives the Hermit Thrush secretes itself in the deep woods, where, on the ground, it builds its nest of coarse grass and pine needles. The eggs closely resemble those of the Veery.

The Hermit Thrush is the prima donna par excellence among our American birds, and it is said that only the European Nightingale can fairly claim to be its peer. Because of its ethereal, serene, and heavenly song, the bird was given the name of Swamp Angel by the early settlers in the Adirondacks. Burroughs calls it "the finest sound in nature. It seems to be the voice of that calm sweet solemnity one attains to in his best moments. It realizes a peace and a deep solemn joy that only the finest souls may know."

The Hermit Thrush

GEORGE W. SCHUSSLER

Thou hermit dweller by Arcadia's pool,
  Thou soul of evening and the silent glade—
Sweet singer of the solitude,—of cool
  And mossy aisles that make a mingled shade
Along the forest floor,—what fount of praise
  And bubbling ecstasy is welling o'er
Those rich and varied warblings through the wold?
  What lingering strain of love and woodland lore
Art waking new amid thy fragrant bays?
  What dear delight inspires, or instinct old?

It is the solemn hush of twilight's hour,
  And now like anthem on the quiet air,
Or distant bell that from some convent tower
  Calleth the sober nuns to evening prayer,
Thy voice is heard; darkling the shadows fall
  And from a deeper distance comes thy song,
And now 'tis gone, and now once more afar
  Its melodies the parting day prolong,
Till dusk and stillness fold each forest hall
  And naught is wakeful save the evening star.

All the notes of the forest throng,
Flute, reed and string, are in his song;
Never a fear knows he, nor wrong,
  Nor doubt of anything.

Small room for care in that soft breast;
All weather that comes to him is best,
While he sees his mate close on her nest,
  And the woods are full of spring.

—From "The Thrush" by E. R. Sill

To the Wood Thrush

WILLIAM P. ALEXANDER

Lines written after hearing a pair of these fine musicians sing together.

'Twas at the close of one Parnassian day,
When Spring was vibrant with a lavish tongue.
And earth was vocal with the pulsing lay
Of glad green June, the flowery glades among;
We heard the wood thrush challenge rivalry,
With regal voice, and grave sweet melody.

And straight with flute-like flourishes, there came
The rich response, from just across the way,
Each sang to put the other song to shame,
And filled the hour with Traubadour display;
An autiphon, that made the slanting beam
A sounding flood, from distant planet seem.

We stood enthralled, and lo! monastic piles
Rose visionlike, and through the mullioned screens
Of trees, a light was shed on mystic aisles,
And gothic grew the towering evergreens;
For in our soul we seemed to hear the choir
Of Notre Dame, draw near and then retire.

It was indeed as though the hand of Bach
Again was laid upon the organ keys,
While bending boughs in festive measure rock
In rhythm with the largo on the breeze;
So rare the chant, of such majestic mold,
It seemed a liquid, strained through bars of gold.

While just beyond another song was heard,
A pandean cadence with a lessening fall,
So like the echo of some spirit bird
Or feathered houri,—Ah, the melting call,
That intermingled with the wood-thrush twain,
Was that the veeries other worldly call?

And yet another obligato rare
Was heard, and well we knew the dainty note,
A moment sounding here, a moment there,
The mellow witchery of the yellow-throat,
Until the song in wondrous beauty 'rose,
A fitting hymn to evenings solemn close.

We homeward strayed in such a pensive mood
As falls on him, who hath been moved within,
Has heard a great voice in the solitude
And feels all beauty to his soul akin;
Then when the night had come with starry hush,
We spoke of this, remembering the thrush.

The Gossip of the Trees

KATHERINE ROGERS

The Maple and the Elm were just waking up after their long winter's sleep, and they had been disturbed by very bad dreams! They had a vague remembrance of rude winds tossing their branches around, and of fearful storms beating upon them, and they had scarcely been able to keep their roots warm enough to preserve life! If it had not been for the thick, heavy blanket of snow that had covered them, they must certainly have perished!

"Ah-h!" breathed the big Maple, stretching her branches and opening her tiny budlets the least little bit in answer to the first warm kiss of the spring sunshine, "I believe Spring must be really here, and it is time to wake up. How are you feeling?"

"Very stiff," said her neighbor, the tall Elm, wearily. "I'm cold all through, and I'm afraid it will take some time to get my sap started." The Elms were known as a family to be a little top-lofty, but the Maples didn't mind that. They had lived beside each other so long that they knew it was only an ingrained New England reserve of manner, and that, once thawed out, the Elms would respond cordially to Spring's advances. But they never could be as hospitable as the Maples, who were a large and rapid-growing family, always welcoming flocks of birds of all varieties to their branches, whereas the dashing Baltimore Oriole was the

only bird that ever presumed to build a nest in an Elm tree, and he chose the tip end of a branch, where his round nest hung, safe and out of reach of marauding cats.

"Just look at that young foreign girl, the European White Birch," ran on Mrs. Maple. "She grows so fast, and her long, slender branches wave about so gracefully, it's a perfect joy to watch her! In no time at all, her delicate little leaves will be dancing gaily, and she never throws a shadow over any one's spirits nor keeps the fresh breezes off, but just shields our Young Lady's room from the afternoon sun and from people passing in the street."

"Yes," agreed the Elm, who was an old bachelor and rather jealous of his young brother who stood opposite the dainty foreigner like a dancing partner, "she's a mighty good-looking girl, and she often nods to me across the lawn. She's quite an addition to our social circle."

"Miss Dogwood is a stunning girl, too! Don't you think so?" said Mrs. Maple.

"Yes," again agreed the Elm, but this time rather reluctantly. "You know she was only a little wild gipsy that our Gentleman found in the woods one day, and he brought her home and set her among us. It only shows the influence of good environment and cultivated surroundings."

"With plenty of light and air and good nourishing soil to feed on," added generous Mrs. Maple. "She certainly is a dazzling beauty, when she puts on her full dress of solid white, touched up with those little dabs of red just at the edges of her petals in time for the Spring Festival. I hear lots of people going by, praising her enthusiastically!"

"For my part," said the Elm, "I think I perfer that Redbud girl. I know she's not as young as some, but her coloring is very refined, and her beauty has only increased with age, as she has grown larger and fuller, and then she is some use in the world. She provides the bees with a lot of honey."

"Oh, well!" replied Mrs. Maple, bridling at the mention of refined coloring, for she knew that she and her daughters always put on bright yellow and red in the fall, "If you're going to talk about usefulness, look at the Pears and the Apples! They not only provide honey for the bees, but fruit in abundance for all the Family, and plenty besides to sell! To be sure, they are a

good deal of care, and have to be sprayed and pruned every year, but first they dress up for the Spring Festival, the Pears in lacy white, and the Apples in what I consider the pinnacle of beauty because they add the most delicious fragrance to their exquisite pink and white blossoms and trim their loaded branches with clusters of rosy buds, and then in the fall they make another show for the Autumn Festival, with their beautiful fruit! It's all very well to be refined and to feed the bees and butterflies, but give me the friend of Man for my choice!"

"I quite agree with you," said the Elm politely, anxious to mollify the ruffled lady, "and I certainly meant no disrespect to those truly noble families. Of course, Miss Redbud was only brought up to be ornamental, and I sometimes think she must be a little lonesome, so far away from her native place."

"That's true!" agreed Mrs. Maple, instantly melted when her warm sympathetic nature was appealed to. "She does deserve credit for doing the best she can, and I must say she never shirks."

"Old Grandfather Oak looks pretty stalwart this year, doesn't he!" remarked the Elm, willing to change the subject to less controversial ground. "Our Family are very fond of him, and he stands by the House in spite of all the operations that he has been through. Why! he's been half hollowed out and filled in with iron braces and rocks and cement, and still he grows, and his head is as good as ever!"

"Yes," said his neighbor, "it's certainly a pleasure and a privilege to be in the same company with him! He gives dignity to the whole place! I believe no one knows how old he is, and the former Owner of the place told our Gentleman that when he was a boy, Grandpa looked just the same! I'm glad our Family are so fond of Trees. They have the Surgeon come whenever one of us begins to get run down or has an accident, and he works over us and saves our lives. Our Young Gentleman took care of our old friend Smoke tree, though, himself. Do you remember that bad storm one winter, when one whole big limb was broken off? We thought that would be his finish, but a little careful cutting and a coat of tar paint healed the wound entirely, and now he looks like a young Bush with a lot of healthy new sprouts coming up from the roots."

"Hello, friends," called out the wild Dogwood gaily, "just you wait till I get dressed, and I'll show you some style!"

"My dear!" cautioned Mrs. Maple, "pray remember your manners, and don't be boastful! If you could only see the Apple family when they are ready for the Festival, you would feel more humble. But they stay by themselves, so far down in the orchard, that we don't see half enough of them."

"It's just as well," said the Dogwood. "They're all right in their place, but they woudn't do for the front lawn, you know!"

"Please remember," said Mrs. Maple, "that your place is really in the woods, and you enjoy the advantages of this society only through the kindness of our Gentleman."

Just then the old Shagbark suddenly woke up, and cried out in a jolly voice, "Here, here, what's all this clatter about! Who cares for looks any way! I like to have a good time, and have the children and the squirrels pelting each other with my nuts." He threw a kiss to the Dogwood with one branch, and to Mrs. Maple with another, and they all laughed together, and then Spring thought it was time to give them all a good cold shower-bath, and after that she warmed them through and through with hot sunshine, and soon they were all as busy as could be, each putting out the loveliest buds you ever did see!

The Chipmunk

A. Leah Gause

One of the most interesting rodents is *Tamais striatus* as Linnaeus called the common hackee or chipmunk. Another name occasionally used for this active cousin of the red squirrel is "chipping squirrel" which seems a suitable term on account of his habit of uttering, "chip, chip, chip," while rollicking with his fellows or when in quest of food. Dr. Hornaday states that "ground squirrel" should not be used when referring to the chipmunk as that name applies to an entirely different species but that "rock squirrel" would be entirely correct because of his preference for stone fences and rocky areas.

There are two main divisions of the chipmunk family, our familiar Eastern type and a very different Western species. Early naturalists who had only a few specimens made many other divisions because of the influence of climatic conditions. In general the differences are in coloring as this increases in intensity toward the south or where there is copious rainfall. In arid regions where there is little shade the pigments in the hair are blanched by the sun's powerful rays causing quite a different appearance. There is also a tendency toward greater length of limbs and tails in southern latitudes.

But no matter how classified, our eastern chipmunk is decidedly interesting when studied. He is a true squirrel, a trifle smaller than the red squirrel but of the same reddish tone. His distinguishing points are his two white stripes extending along the side of the back from his fore shoulder to the root of the tail. Each is bordered by a black line although the coloring and stripes

seem to vary somewhat in different locations. In the far west there are more light stripes and sometimes a checkered appearance. All have light colored underparts.

Our chipmunks are graceful in form and pert and quick in their movements. Their characteristics in the mammal realm resembling that of the wren in the bird realm, having an air of pride and alertness that is most engaging. If not so common, their fur would probably rank almost as high as sable or ermine.

They dwell in burrows in the ground and have acquired a trimness of form and traits—such as small close ears and very slightly bushy tails, suitable to their habitat. The claws are strong, the teeth are both strong and sharp, the front ones are slender curved chisels which are admirably adapted to cut through the hard shells of nuts and the bark of underground stems. Well developed cheek pouches are a sign that these animals are not well endowed with powers for either defense or escape but pick up their food and scamper home to eat at leisure. When collecting food these pouches are invaluable and a chipmunk with well loaded cheeks is a comical object. If nuts are gathered he nips off any points that may occur on the surface then pushes each into a pouch with his fore paws. Four nuts constitute a good load. Sometimes one may be seen jumping along a fence with a pignut in either cheek and one between his teeth.

Chipmunks are very partial to sunflower seed for food but will eat corn, buckwheat, wheat and almost all small nuts. Their habit of storing food in their underground store houses is of great benefit to mankind as very often much more is stored than is needed and the surplus helps plant many oaks, hickories, hazel shrubs, chestnuts and wild cherry trees in our landscapes. So although our granaries and nut supplies may be depleted by these active burrowers our landscapes may be richer in sources of future nut production.

The burrows are so dug that a good outlook may be secured from the doorway and yet avoid attacting attention. Perhaps an almost perpendicular tunnel extending into the earth for three or more feet is first made which soon bends so that a horizontal apartment comes next, which leads upward a trifle to a roomy space carpeted with soft, dry leaves. In this room the four or more young are carefully tended until they are large enough to look out for themselves. There may be other rooms leading off

from the main tunnel which are usually made late in summer and are used for storehouses. In one such room there was found stored one quart of hazelnuts, eight quarts of acorns, two quarts of buckwheat, four quarts of wheat and some grass seed. Much of this had been brought a long distance. The question of human food supply might be a less difficult one if chipmunk methods were possible. There is always a back stairway to the underground dwelling whose opening on the surface is a considerable distance from the other. One or both of the doorways may be well sheltered, sometimes by a shrub and other times by an old stump or stone. Newly dug earth is almost never found near the openings but at some distance from them. This leads to the supposition that the cheek pouches may carry other things beside food. In going to and from the burrows our busy friends seem to avoid making a path which might guide an enemy toward the home.

Among the enemies disturbing chipmunks is the farmer's cat, which is searching for food for a family of hungry kittens. His cousin the red squirrel will often give chase hoping to secure some provisions. Hawks and owls may pounce upon him as he scampers along zig zag fences but worst of all is the weasel which enters the burrows and destroys the young.

Although a squirrel, a chipmunk rarely takes refuge in a tree. Sometimes when very much frightened, he will ascend the trunk to the height of perhaps fifteen feet and will then cling there helplessly waiting for the danger to pass. When he does descend he does so spirally.

Unlike the woodchuck he never becomes dormant during the long cold season but if the ground is free from snow he often goes above ground to enjoy the light and warmth of a sunny day. Even during stormy weather he has a habit of waking and partaking of the stored food at frequent intervals.

Chipmunks are very talkative among themselves. Perhaps five or six of them will spend several hours of a warm afternoon chirruping turn about or all together. Occasionally a cry of warning is given when all will give a series of alarm notes as long as the disturber is in view.

These animals to whom nature gave many "black marks" do not appear easily frightened if people are quiet and slow of movement. A girl who was watching one sat on a stone wall for a

considerable time and except when she moved he never took his eyes from her. She finally grew restive under his scrutiny and ran away. This is just the reverse of the old notion that the human eye is always able to stare a wild animal into submission.

One chestnut colored horse which traveled many a country road, was always on the look out for chipmunks scampering along the top rail of fences. As soon as he caught sight of one a race began, which was often quite a surprise to the driver seated in the vehicle. The minute the chipmunk came to earth the race was off and the pace of the chestnut traveler slowed down. But his ears and eyes indicated that for him the race was only half long enough and if he could he would challenge his opponent for more.

Once it was decided to test the chipmunk's knowledge of nuts by putting out quite a mixture of good and bad ones. His test was evidently by weight and all sound ones were carried off and the poor ones dropped. He was never known to make a mistake. All the nuts left were cracked and found worthless. When given cracked hickory nuts he ate out the meats at once and never offered to store them.

One unusual story of these tireless creatures is told without quoting the authority. During a dry season a woman watered some plants near a porch, soon afterward a chipmunk passed the porch and seemed interested in the plants. He was seen standing on his haunches and with his fore paws pressing the edges of a leaf together for a trough from which he drank a few drops in the most comical fashion. Five other leaves were treated in the same way while the woman stood and watched. She then placed a dish of water near by which was then regularly used both for drinking fountain and bathing pool.

Syllabus of Garden Nature-Study

Cleveland Public Schools
Division of Educational Extension, Garden Department
ROLAND W. GUSS

Bulbs and Window Plants

March

Flowers and Seeds (How Flowers Make New Plants)

For Grades 1 to 4

Questions for Thought (Attractiveness of Flowers. Flowers and Insects)

Why do you like the flowers?

What do you like about them?

What besides people seem to like the flowers?

Find out whether the children have observed *bees* and *butterflies* visiting the flowers?

How do they help the flowers?

How do the flowers help them?

When some of the flower parts wither or fall away, is that the end of the flower's life?

Observations and Interpretations:

Flower Parts.—Have the children *examine* and see the parts of flowers of tulips, narcissi(daffodils, etc.) or of geraniums or other plants in the room—fresh and "going to seed."

Compare the "Seed boxes" in fresh and fading flowers.

Make *cross-sections* of enlarged seed-boxes and find and show the *seeds* forming inside.

In such flowers other parts are withering or have fallen away because *their work is done.*

Uses or work of Flower Parts.

(*Grades 3 and 4*)

What work?—Teach that the *stamens*, with "pollen boxes," furnish pollen (find some) to make the seeds grow.

The colored parts (*calyx and corolla*), their fragrance, stripes, etc. (like sign boards) advertise the presence of nectar and pollen to insects, the carriers of pollen.

(Flowers yielding more abundant, powdery polien may be shown if twigs of alder or poplar are placed in bottles of water till the buds open.

Such pollen can be carried by the wind; hence there is no need for the help of insects or for colored flower parts, odor and nectar to attract them.)

How Pollen Helps. (The *Story* of one Life Helping Another)

In the same or higher grades, bring out the *story* of how the pollen grains get to the sticky *stigma* at the top of the "seed box" or *ovary* and send down tubes through which they add their life to that of the tiny living bodies inside the ovules ("little eggs") within the seed box and cause those living bodies, wakened by the magic touch of other lives, to grow into "baby plants."

The ovules now become *seeds*. (See Morley, Song of Life, pp. 27-33.)

The terms *pollination* and *fertilization* may now be used in higher grades, if their meaning can be made clear.

Diagrams like those in Wm. Hamilton Gibson's "Eye Spy," in the chapter, "Riddles in Flowers," may be placed on the blackboard and children in middle grades may copy.

OTHER REFERENCES (for teachers of these and higher grades):

Comstock, Handbook of Nature-Study, pp. 492-494 (Flower parts, Flowers and Insect Partners): pp. 603-606 (Tulips); pp. 599-602 (Daffodils and their Relatives); pp.643-647 (Geraniums)
Morley, Song of Life, pp.33-42.
Schmucker, The Study of Nature, chapter XVI. (Reproducing the plant.)
Dana, Plants and their Children.
Gibson, Blossom Hosts and Insect Guests.
Keeler, Our Garden Flowers.
Bailey, Bergen, Atkinson, Coulter, etc., Botanies.
Morley, Flowers and their Friends.
Grant Allen— The Story of the Plants (chapters VI to X.)
Hunter, Biology, pp. 40-43; 81-83.
Peabody and Hunt, Plant Biology, pp. 82-87; 119-124.
Lovell, The Flower and the Bee.
Bailey, Nature Drawing.

(*For Grades 5 and 6 and Higher Grades*)

Review if necessary, and continue the work on flowers and seed production outlined for lower grades.

How Each Part of the Flower Helps:

1. Fruit and seed producing parts ("essential" or necessary organs).

(a) The *pistil*, composed of *ovary* (seed-box proper, which becomes the "fruit," containing seeds), the *style* (sometimes absent), supporting the *stigma* (sticky, to hold pollen).

(b) The stamens, with anthers (pollen "powder-boxes").

Which usually stands higher, anther or stigma?

Could pollen *fall* on the stigma of the same flower?

In what other way could it be placed there?

Advantage of insect pollination over wind pollination?

Teach that when one plant is helped by another thus, the resulting seeds may produce *better* plants (at least different plants, from which nature or man may *select* better ones.)

Cross-feterilization and *hybridization* may here be explained (to upper grades), as means of securing new and improved varieties.

Story of Luther Burbank's work, etc.

2. Parts for the *protection* of other organs and for *attracting* insects (carriers of pollen).

(a) *Calyx* (of sepals);

(b) Corolla (of petals), sometimes with fragrance, "nectar guides," and nectar (at base).

Find and taste some of the latter at the bottom of the cup of a freshly opened narcissus blossom.

In "single" geranium blossoms both nectar-guides (stripes or lines leading toward the nectar well) and nectar may be found.

Why not in "double" geraniums or daffodils?

If possible have children observe that—

Tulips and *Narcissi* have six colored parts (calyx and corolla, together called perianth).

The *Narcissi* have also an extra outgrowth from the perianth parts called the *crown* (cup-shaped), the depth or color of which varies in different varieties (daffodils, paper-whites, "Chinese sacred lily," jonquils, poet's narcissus, etc.)

Hyacinths, the *paper-white narcissus*, etc. having smaller flowers, these "club together" in clusters and make a larger mass of color to attract the attention of insects.

In *double Tulips*, etc., stamens grade off into petals (deficient anthers may sometimes be found on their edges) and in some "double" flowers so many of the parts needed for seed production devote themselves to "looking pretty" that few seeds or none are produced.

How then may new plants be obtained from plants having double flowers? (later lessons).

Flower, Insects and Fruit Production (Higher Grades).

Try to get answers from the pupils to this and the following questions:

Why do not all the seed-boxes (ovaries) of single flowers become enlarged and bear seeds?

What besides seeds will not grow if flower pistils are not helped by pollen?

To raise melons in a greenhouse in winter the blossoms must be pollinated "by hand." Why?

To raise cucumbers for the early market, a hive of bees is taken into the greenhouse. Why?

Why do bee-keeping and fruit-raising go well together?

Without the visits of insects carrying pollen, and in many cases the pollen not merely of other plants but of other varieties, we should have few if any melons, cucumbers, strawberries, cherries, plums, grapes, cranberries, pears, apples, etc. (Lovell, The Flower and the Bee.)

Adaptations of Other Flowers

In *later lessons*, in the school room and during *trips* to greenhouses, gardens, parks, and woods, blossoms of many of the above as well as of wild plants should be compared with those already studied and their special adaptations for receiving help from insects made out if possible.

Correlations:—Story writing—Life History of a Bulb.

Keeping a *Nature Note-book*, with outlines, stories, pictures of bulbs and flowers pasted in, diagrams and sketches, made by the children, of flowers and flower structure and of bulbs in different stages of development, new bulbs forming (next lessons), etc. (See Bailey, Henry Turner, Nature Drawing).

Poems.—

If these lessons are properly taught, bulbs and bulb flowers and other flowers will mean more to the children than they did to him of whom it was said:

> "A primrose by the river's brim
> A yellow primrose was to him,
> And it was nothing more."

Instead they can appreciate Wordworth's "Daffodils" and can say with Longfellow,—

> "In all places then and in all seasons,
> Flowers expand their light and soul-like wings
> Teaching us by most persuasive reasons,
> How akin they are to human things."

Or with Tennyson,—

"Flower in the crannied wall,
I pluck you out of the crannies,
I hold you here, root and all, in my hand,
Little flower—but if I could understand
What you are, root and all, and all in all,
I should know what God and man is."

Children who can have opportunity early in the spring to see bulbs coming into bloom in the school yard or in the parks or gardens will appreciate better the lines in the old readers:

"Daffydown Dilly came up in the cold through the brown mold.
Although the March breezes blew keen in her face,
Although the white snow lay on many a place."

And these from Julia Dorr,—

"Roly-poly honey-bee,
Humming in the clover,
Under you the tossing leaves,
And the blue sky over,
Why are you so busy, pray?
Never still a minute,
Hovering now above a flower,
Now half buried in it!"

Garden Nature-Study

Lessons for Week of March 21-25, 1921.

The Spring Awakening

How Plant Storehouses Prepare for Early Spring Flowers and More of Them.

Materials Needed—Bulb plants in different stages of development, including some "spent" bulbs (bulbs done blooming) of tulip, narcissus, etc. washed free of soil;

A few dry bulbs of the same that have not been forced;

An onion and if possible, crocus or gladiolus bulbs and an Easter lily and a cyclamen done blooming;

A small cabbage head, a potato, a beet or a carrot with roots in a jar of water;

Underground storehouses of any early spring flowers, such as bloodroot or trillium or violet (rootstocks), adder's tongue or Jack-in-the-pulpit (corms);

Twigs of lilac, cottonwood poplar, willow or others with large buds (set in bottles of water);

Iodine solution (tincture of iodine, diluted with water, 1 to 10).

For Grades 1 to 4.

Questions for Thought (Early Blooming—Advantages; How Made Possible):

When do plants that grow from bulbs or other thick underground parts bloom?

Answer: Often in winter indoors; or very early in the spring—outdoors.

How are such plants helped and how do they help the bees, etc. by blooming so early?

Answer: They can secure help from the bees, etc. before the latter get busy with too many other flowers and before too many leaves of other plants and trees are out to shade them and conceal them from the insects.

In return they provide the insects with the food needed by the latter after their long winter sleep.

What food?

Answer: Nectar and pollen.

How do the insects *help* these early flowering plants?

Why can they bloom so early?

Lead children to account for this by finding the stored food.

Cut open a bulb and show the layers.

Compare the thickness and firmness of these in a fresh bulb or in one just beginning to sprout and in one done blooming.

For what has some of the stored food been used?

For Grades 3 and 4.

Starch—One kind of Food Stored by Plants.

Experiment 1.—To show how to detect *starch* and to find whether it is present in plant storehouses.

Mix a tiny bit of laundry starch or of cornstarch (such as people use for food) with a little boiling water in a test-tube. Then add a drop of diluted tincture of iodine. Note the blue color produced. Starch is the only plant material that gives this color with iodine.

Now treat a bit of each of the following (or as many as possible) with boiling water (or use portions previously cooked) and then test with iodine: a fresh bulb or one that has new storage parts forming, an onion, a potato, a rootstock, a corm, cabbage, etc.

Older children may be encouraged to make these tests at home, trying also various grains and other seeds and cereal products. Ask them to report in which they find starch stored.

Need for Water—to Dissolve and Carry Starch.—Why must bulbs be watered to secure good blooms? Name any kind which needs to be supplied with nothing but water?

Why then must bulbs have good roots before they produce leaves or flowers?

Can they get along without light or much heat?—

Answer: Yes: until the flower buds are ready to open. Why? (Fuller answers in later lessons).

For Grade 5

Kinds of Plant Storehouses

Additional *Questions for Thought* and to Stimulate Further *Observation*:

Where do people usually store vegetables used for food? (In cellars or in pits dug in the ground.)

Name any plants that store food under ground. Why is that a good place? (Protection from injury due to freezing and thawing; from injury by animals; etc.; nearness to water supply in the spring.)

In what parts of the plant do each of the following store food? (Test for *Starch*. See Experiment 1.)

Bulbs.—Note in a vertical section of a bulb that has sprouted and has had for some time, and still has, good, healthy green leaves, what these leaves connect with in the bulb (*stem* at bottom of bulb) and how the parts of the leaves within the bulb compare with the parts above in color, thickness, closeness. Why?

Were the other layers or scales of the bulb once the lower parts of leaves?

Compare with the *cabbage*. In what does it store food? (Thickened leaves).

Show a vertical section and have children observe the thickened stem to which the leaves in the center of the head are attached. Is there food stored there also?

Compare a crocus or gladiolus or cyclamen bulb (*corm*) and note that food is stored in a broad, thick stem.

Compare a *potato*.—Food stored in the thickened *stem* (tuber). Why not a root? Has buds ("eyes") from which new branches (sprouts) come. Show some long sprouts.

Compare a sweet potato.—A *root* (has no "eyes").

Compare a *beet* or *carrot*.—Mostly *roots*, but may have buds at top.

What comes from those after the roots have been standing in a jar of water?—Leaves, etc.

If planted again, from such roots, will come flower stalks, and blossoms, producing seeds, a work which they could not complete the first year.

(Hence, another use for stored food?)

Such plants are called biennials.

Is the cabbage a biennial?

How and when are *its* seeds obtained?

Compare the thickened, underground parts of bloodroot, violet, etc.—Underground *stems* (*rootstocks*).

Compare the large *winter buds* of lilac, poplar, etc. (Note what comes from them when allowed to stand in water), with a cabbage-head and with a narcissus bulb (vertical sections of each).

The latter are also practically large *buds*, What do buds contain? How did they prepare for the "burst of spring?"

Name any trees that *bloom* before they leef out?

Do maple trees bloom early? What is their stored food made

into in early spring when the "*sap* is running" to where the blossoms and leaves are to be formed?—*Sugar.*

For Grade 6 (May be started in Grade 5)

How New Bulbs are Made

In what other way (besides producing seeds) do bulb plants provide for increasing the number and continuing the life of their kind?

How and where and when are *new bulbs* produced?

Where is the food to be stored in them obtained and prepared? How?

Review such parts of the lessons for Grades 1 to 5 as have not been taught and are needed to understand the following.

Observations:

Have children observe *vertical sections* of bulbs that have been growing for some time (keep them watered and in the light) since they bloomed and that have healthy green leaves.

Find *new* bulbs forming. Where? Draw.

Test for starch (See Exp. I).

Other foods stored in bulbs and in other thickened parts of plants are—sugar (sugar beet), proteids (material to build living *protoplasm*).

Experiments. (How Leaves Help)

The following experiments will show where bulbs and other plants get and prepare some of their food; also other important things about plant activities.

Exp. 2.—Why plants must have *light* and *air* and how in getting some of their food they *purify the air.* (Suitable for upper grades.)

Fill two wide-mouthed bottles (pickle bottles or small fruit jars will do) with water, insert in one (top first) some fresh bulb leaves or a cutting from a plant such as geranium, begonia, etc., and invert the bottles in a basin, or pan one-third full of water.

By means of a straw or a piece of macaroni inserted under the edge of the bottle, fill each with air which has been held in the lungs as long as possible (it may be necessary to dip some of the water out of the pan).

Set the pan with the bottles or jars in the sunshine for a day or two. See test (h) below also.

Then make the following tests:

(a) Remove the cutting while the mouth of the bottle is still under water, place a piece of greased window glass or other tight-

fitting cover against the mouth of the bottle and after turning it mouth up, lower into it for an instant a lighted match or candle (attached to a piece of wire), sliding aside and then returning the cover.

(b) Also pour into the bottle a little clear lime-water and shake.

(Lime-water may be bought at a drug store or may be prepared by slacking a little fresh lime in a bottle of water. After the extra lime has settled, the clear lime-water may be poured or siphoned off into another bottle.)

(c) Do the same with the other bottle.

Note in which bottle the flame is extinguished. Why not in the other? Also note which makes the lime-water more milky.

(d) Try the candle test in a bottle filled with breath (expired air) which has not stood in the sunlight. Result? (The flame is extinguished as before.)

(e) Try the candle in a bottle of *fresh* air. After covering the bottle, allow the candle to remain till the flame is extinguished. Remove the candle and test the candle's "breath" with lime-water.

(f) Vary the experiment by lowering the candle into the bottle first and then blowing in the breath *slowly* through a long tube reaching to the bottom of the bottle.

What do both the candle's "breath" and the human breath contain?—(*Carbon dioxide* or carbonic acid gas which changes the lime in lime-water to limestone.

We are like the burning candle in that we take oxygen from fresh air and by combining it with the carbon of fat or starch or sugar, make carbon dioxide while producing heat or other energy.)

(g) A bottle filled with the "breath" (products made by burning) of a candle (e) and containing a cutting from a green plant may be exposed to the sunlight, as in the first part of Exp. 2, and then tested as in (a) and (b).

(h) Repeat the experiment with the bottle containing a cutting, but allow it to stand not in the sunshine but in a dark closet. Test as before. Compare and account for the difference in result.

Encourage the children to try the experiments *at home*.

Conclusions:

Teach that green plants in the sunlight remove from the air carbon dioxide gas which we exhale in our breath. They put

oxygen in its place. The gas which extinguishes the flame when too abundant, would put out "the vital spark" if not removed. It furnishes *food* to the plant. (Connect with Hygiene and Sanitation.)

In past ages much carbon accumulated by plants was made into *coal*. The heat and other energy which this now furnishes has been called "bottled sunshine."(Connect with Geography, etc.)

We eat plants and so get carbon to burn which in turn escapes in our breath.

In winter the winds bring us pure air from the places where plants are growing for "it's always summer somewhere." (Connect with Geography.)

Discuss other effects of light on plants and the behavior of plants toward light.

Recall the color of potato sprouts; turning of leaves to the light; why leaves are flat, thin, and broad, usually; shapes and arrangement of leaves with reference to light; how climbing plants seek light.

References: Atkinson, First Studies of Plant Life, ch. 20, 21; Bergen, Elements of Botany, old edition, ch. 10; new, ch. 11; Coulter, Plant Relations; Davis, School and Home Gardening pp.62, 63, and 64; other Botany and Chemistry text-books.

THE NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN ELEMENTARY SCHOOLS

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Editorial

The Present Status of Nature-Study

For a quarter of a century the Editor has been working with the teachers of our land, trying to help them to introduce and to teach successfully nature-study in the schools. There have been many "ups and downs" in this enterprise and of the latter we have been made painfully conscious. To begin with, the established curricula of the public schools stood like a stone wall, apparently impregnable and insurmountable against a study so simple as that which made a child intelligent about his natural environment. To end with, the many objections on the part of the teacher to the introduction of a new subject that could not be reduced to rule and memorized were so numerous, so small, so sharp, that to meet and conquer them was like fighting mosquitoes.

By continual prodding some holes have been made in the wall and the air is pretty well cleared of mosquitoes at the present time. We find cities, villages and states laying out courses in nature-study, although sometimes it is called junior or elementary science. These courses are extensive, helpful and practical; a very excellent one for Pennsylvania is on our table now having come to us recently. Many of the normal schools are giving courses in nature-study this summer; it is a conservative estimate that five thousand teachers are taking courses in this study in summer schools.

Our own encouraging experience is shared by other teachers in summer schools, and that is the teachers are far better prepared than formerly and many of them have had a year or more of experience in teaching nature-study in the various grades. They come to us with many pertinent and searching questions and valuable suggestions. These things and many others show that

the battle is really won although there are many outposts that still remain to be taken, but they will undoubtedly succumb in the course of a century or so.

It has seemed strange that a child interest so persistent and obvious as that manifested in birds, flowers, trees, animals and stars should have been so long ignored and crushed back in the schools. But the children of this great country of ours will sometime come into their rightful heritage,—the understanding companionship with natural world; and the schools will be the greatest factor in accomplishing this needed and noble work.

Prof. J. A. Drushel, Harris Teachers' College, St. Louis, gave a course in the summer session at Columbia.

M. R. Van Cleve, Director Nature-Study, Toledo, directed work at Chautauqua Institute.

Prof. Detwelier, London, Ont., instructed at Cornell University.

Dr. E. L. Palmer, Cornell University, gave a course at University of California.

Prof. Wayland J. Hayes directed a course of Nature-Study at University of Virginia.

The Minds and Manners of Wild Animals. W. T. Harnaday, 328 pp. Illustrated. Scribners.

There is, probably, no other man in America or possibly in the world so well fitted by experience to write on the minds and manners of wild animals as is Dr. Hornaday. For years he was a collector of mammals for museums in almost all the wilderness countries of the world; and he had the skillful hunter's opportunity to study the minds and manners of wild animals in their natural environment. Since 1896 he has been in charge of the New York Zoological Gardens which he has built up to a high rank among the Zoological Gardens of the world. He has made it a part of his business as a measure necessary to his success to study the habits and dispositions, the comfort and the peculiar ways of animals in captivity, therefore we might expect that he would give to us this most important book which is a joy to animal lovers and will surely be of real service to the animal psychologist.

Dr. Hornaday is conservative in his statements of facts as observed by himself and his interpretations of animal behavior are sane and dependable, moreover there is not a page in the book that is not interesting. In fact, certain chapters are full of thrills and Dr. Hornaday's sense of humor adds greatly to the reader's enjoyment. In his introduction he says "If every man devoted to his affairs, and to the affairs of his city and state, the same measure of intelligence and honest industry that every warm-blooded wild animal devotes to its affairs, the people of this world would abound in good health, prosperity, peace and happiness. To assume that every wild beast and bird is a sacred creature, peacefully dwelling in an earthly paradise, is a mistake. They have their wisdom and their folly, their joys and their sorrows, their trials and tribulations. As the alleged lord of creation, it

is man's duty to know the wild animals truly as they are, in order to enjoy them to the utmost, to utilize them sensibly and fairly, and to give them a square deal."

The chapters cover the following topics: The Lay of the Land: Wild Animal Temperament and Individuality: The Language of Animals: The Most Intelligent Animals: The Rights of Wild Animals: The Brightest Minds Among Animals: Keen Birds and Dull Men: The Mental Status of the Orang-Outang: The Man-Likeness of the Chimpanzee: The True Mental Status of the Gorilla: The Mind of the Elephant: The Mental and Moral Traits of Bears: Mental Traits of a Few Rodents: The Mental Traits of Birds: The Wisdom of the Serpent: The Training of Wild Animals: The Morals of Wild Animals: The Laws of the Flocks and Herds: Plays and Pastimes of Wild Animals: Fear as a Ruling Passion: Fighting Among Wild Animals: Wild Animal Criminals and Crime: Fighting with Wild Animals.

The chapter on The Rights of Wild Animals should have a wide influence. Of the other chapters of the book, it is hard to tell which is the most interesting; perhaps the one on Elephants will captivate more of the general readers than the others. We are sure that we shall always retain a deep personal interest in Alice, the elephant that has a curvature in the brain. We predict that this volume will find its place in every Nature Library as a most valuable and pertinent book of reference on wild animal traits.

A Naturalist in the Great Lakes Region. Elliot R. Downing. 328 pp, illustrated. The University of Chicago Press, $3.50, postpaid $3.65.

Men who act as nature guides for tourists are not uncommon now in our great Western parts, but it has remained for Dr. Downing to write a Nature Guide for the tourists of the Great Lakes; and according to his usual methods he has done exceedingly well that which he has undertaken. A glance through the book gives the impression that a great amount of labor is represented on its pages; it is a veritable encyclopedia of the natural world environing the Great Lakes. Much space is given the geologic history of the region and the consequent extension and limitation of the fauna and flora. The chapter headings are as follows: The Changing Face of Nature: The World In the Mak-

ing: The Story of Our Rock Foundation: The Glacial Period: Lake Chicago and Its Old Shore Lines: Distribution and Adjustment: The Dunes and Their Plants; Animals of the Dunes: Interdunal Ponds and Tamarack Swamps: The Climax Forest and Its Predecessor, The Oak-Hickory Type: Lake to Forest or Prairie: Lake Bluff, Ravine, and Ravine Valley: Brook, Creek and River: Some Sources of Our Fauna and Flora: An Outline of Some of the Important Plant and Animal Associations. A valuable characteristic of the book are the tables and especially the maps. There are many and excellent illustrations. The book is bound in soft covers and will fit well into a pocket. We can imagine the members of the Chicago Nature-Study Club going afield, each armed with a copy of this Nature Guide Book. It should be sold at news-stands for tourists, for seldom has a book been written so calculated to make intelligent an inquiring travelling public. The volume is equally valuable to the Scientist; to our mind it is one of the most important written by this eminent biologist.

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Photo by Verne Morton
Enjoying the Lady's Slippers without gathering them

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THE
NATURE-STUDY REVIEW

VOL. 18 OCTOBER, 1922 NO. 7

Conservation and Nature-Studies in the Public Schools of Washington, D.C.

R. W. SHUFELDT

There is, at the present time, quite a struggle on foot in the public teaching centers of the District of Columbia, involving certain lines of instruction; it has already reached a stage rather complex in character, to say the least, there having been drawn into the contest various officials of the United States Bureau of Education; nearly all the teachers in the public schools; many men and women of wealth; a large body of the parents of the children attending the public schools, with a big scattering of others more or less profoundly interested in the outcome of the matters under debate. When viewed from the proper angle, the various factors of the problem under discussion may readily be appreciated; and they are, while dissociated in some respects, as a matter of fact component parts of a certain great question in our present-day methods of teaching in the schools of this country in general and in the public schools in particular.

The introduction of this comparatively new branch of teaching calls for a class of especially instructed teachers, and these teachers are expected to command training and knowledge of an unusual character.

The matters here to be discussed are by no means new to our school directors, teachers, parents, and the public, as they have, at different times, come before the teaching constituency in towns and cities of all civilized countries, and were, many years ago, especially agitated in England by Professor Huxley.

As a matter of fact, we are once more called upon to consider the value or uselessness, the propriety or senselessness, the short or farsightedness pertaining to omitting or incorporating nature-studies into schools, adapted to the various public school grades, as a part of the mental training and instruction given to our children. Hand in hand with such instruction comes the formation of small school museums, containing such nature material of this country as will properly supplement the instruction given along such lines; secondly, and in many ways associated with those factors, should instruction be given in elementary gardening and agriculture—the school children of all grades, according to their ages, being actually instructed in such matters, as well as brought to the practical side of it through the care and management of school gardens.

Finally, should all these children mentioned, according to the various grades, be strongly encouraged by their parents or guardians and their teachers to take their exercise in the woods and fields, taking in, as a part of such exercise, swimming, rowing, and tree and hill climbing, and while so engaged make studies and collect specimens of the flowers and living things they have been shown by their teachers, have handled in the school museums, and read about in their nature books. As a part of such training there should be instilled into their young minds, as they develop, all that falls within the sphere of elementary instruction in such a department, as the conservation of our national resources, as our forests; such animals in nature as it is desirable to protect; our national parks; our great water-falls, and similar attractions of the nation as a whole.

Those who advocate the introduction of all that has just been pointed out above into the course of instruction now given in our public schools by no means aim to do so at the expense of any of the other lines of study, such as general history, geography, mathematics, and the rest. All these questions are now being discussed with the greatest earnestness in Washington by all concerned, even by many of the children in the higher grades, who take a most lively interest in the possible outcome of it all.

If scientifically handled in all respects, it is claimed by the advocates of these added lines of endeavor and instruction in our public schools that one of the most valuable and useful of human faculties, one that makes more powerfully than any other for a

successful career in life, is that of *accurate observation*, and that to gain this early in life is of paramount importance. Also that no study in the entire curriculum of our schools can develop these observational powers nearly so well as the study of all that nature can furnish. Surely mathematics, history, languages, or any subject of that class, cannot pretend to compete with field and class-room studies of flowers, trees and animals of all descriptions in nature. But our space here will not admit of specific proof and demonstration of this statement.

Whether a boy or girl is better off exercising and studying nature where nature lives, than the boy or girl who attempts to gain instruction and mental stimulation through sitting two hours in a motion picture theater, vacantly staring at scenes pictorially impressing upon their growing minds the outcome of marital mistakes, vulgar dances, all the nonsense of the socalled "comics" and the rest—I leave it to any sensible father and mother to say. Moreover, when not at such places, children are often idling at home or elsewhere, or materially helping to increase the bank accounts of keepers of candy-stores and vendors of ice-cream cones.

As to every school maintaining a museum of natural history objects, collected by the children in its neighborhood or donated by others, there is so much in its favor and practically nothing to condemn it, that to discuss the matter at all would be a waste of time, energy, and valuable space.

Our "Boy Scout" system is all well enough in its way, if properly regulated and conducted by the right class of scout-masters; but the boy scout *and his hatchet* is responsible for no end of vandalism in the beautiful woods that are, in many cases, so close at hand in the environs of Washington. It is all right when these boys are under the observation of duly appointed scout-masters; but when it is otherwise—well, it is better to forget much that they do, and much that I know from personal observation.

We cannot start too early to teach the children in our schools the necessity, in such a country as ours, for conserving and protecting our forests; they should grow up with the idea firmly fixed in their minds that almost without exception all the forms in America's wild life demand continuous and strict protection at all times, and, finally, that each and all of our grand and beautiful water-falls, gorges, natural bridges, streams, lakes, and

similar features, are to be preserved as they existed when man first discovered them—as far as may be possible.

Personally, I most emphatically stand for the introduction of nature-studies into the course of instruction in our public schools; for the maintenance of school museums; for the study of elementary agriculture and maintenance of school gardens; for the kind of exercise that the out-of-doors offers, and for a full course in the elements of conservation and all that attaches thereto. I am sure that the adoption of what I have here attempted to point out will result in the rearing of our boys and girls in a way that leads to the highest plane of good citizenship, leads to that which compels respect for Americans on the part of other nations, and to a type of men and women that make the best of home builders—sound in mind, and having within their make-up all that nature, and nature only, can give to such progressive men and women.

Painted Trillium

By Robert Sparks Walker

All parts in three, is why that we
Are trilliums called. My leaves of three,
With petals, sepals three, oft I
Grow eight to sixteen inches high,
On banks of woodland brooks all cool,
Where turtles shun the soft toadstool!

My leaves ovate in whorls are set,
Each tapers to a point is met;
My narrow sepals green you spy,
The handsomest trillium am I!
With graceful curving wavy edge,
White petals strongly marked with wedge

Of crimson V, always is found
In April and warm May's moist ground.
A little later you'll remember
To come and observe in September
My small dark scarlet berry ripe,
A neighbor to the Indian Pipe!

The Yellow Lady's Slipper

CLARA THOMAS,
Washington, D. C.

"Rushes tilting their burnished spears
These are her courtly cavaliers
Heart of my heart, we forswear the Rose,
We have been where the lady slipper grows."
—*Clinton Scollard* '*In the Heart of June*'.

The downy or yellow Lady's Slipper, *Cypripedium pubescens*, which bears the pretty local name of "whip-poor-will shoe," is closely related to the beautiful and interesting Lady's Slipper of Europe, *Cypripedium calceolus*, the species on which Linnaeus

founded the generic name *Cypripedium*, and on which an entire tribe of the great orchidean order, namely, *Cypripedieae*, is based.

Cypripedium calceolus, once plentiful in sections in England, has now become almost extinct, but it is still met with in some parts of Central Europe. This beautiful species is held in much esteem and, indeed, reverence in parts of France where it is given the attractive name of "Sabot de la Vierge" and "Soulier de la Notre Dame." The name Cypripedium is derived from the Greek word Kupris, one of the names of Venus and "podion" meaning slipper, in reference to the slipper-like form of the pouch or labellum, whence also the popular name Lady's Slipper and Slipperworts. While some flowers reveal their beauty at first glance others do not manifest it until subjected to closer scrutiny. The Cypripedium belongs to the latter class.

Cypripediums have an interesting history, and when comparisons are made with any genus belonging to another tribe, we will find that they differ from each other structurally far more than any two flowers of other tribes of *Orchidaceae*, so we are forced to consider that an enormous amount of extinction must have swept away a multitude of intermediate forms and left this single genus as a record of a former and more simple state of the great Orchidean order. Not alone does the structure of the flower furnish the only evidence of the Cypripedes being a more primitive race of orchids than other existing forms. An ecological study tends to the conclusion that the individual plants comprising the various species have existed in great numbers, and have been spread over a much larger area than they at present occupy in the wild state, and a gradual process of extinction has been surely in operation here as it has been with more primitive types in other natural orders.

The true cause of their gradual extermination may be found when we closely examine the reproductive organs of the flowers. A very cursory examination of these must satisfy the most casual observer that self-fertilization is impossible, and that nature had proclaimed a definite law to the effect that in order to perpetuate their race, fertilization must be effected by the pollen transferred from another flower or plant, and this thru the agency of the insect world.

A brief description of the structure of this unique flower will reveal the wonderful mechanism by which this cross-fertiliza-

tion is accomplished. The basal part of the labellum is folded round the short column so that its edges nearly meet along the dorsal surface, and the broad extremity is folded over in a peculiar manner, the overarching edges being inflected or sometimes only smooth and polished internally. This is of much importance, as it prevents insects which have once entered the labellum from escaping thru the great opening in the upper surface. There is but one means of escape, namely, by way of one of the two orifices in the labellum close to the column. Let us follow the path of a small bee:—Finding it impossible to escape by the large opening, she crawls up into the narrow passage towards the smaller portholes admitting daylight into her prison. Here she must creep under the stigma which protrudes its convex surface as a low ceiling to this cell which is only large enough to admit her body. The surface of the stigma is beset with minute, rigid, sharp-pointed papillae, directed forward, which are excellently adapted to brush off any pollen which may have adhered to the insect's head or back while visiting another flower. Her way is now clear to freedom, but just before emerging she must pass by the anther which stands behind and above the lower surface of the stigma. The grains of pollen are coated by and immersed in a viscid fluid, which is so glutinous that it can be drawn out into short threads. This pollen has but to be touched to adhere to the bee's head or back, so that tho it can be carried quite readily to another flower, there is no way in which it could be brought in contact with the stigmatic surface of the same flower.

Darwin tells most interestingly of his experiments in the fertilization of *C. pubescens*. He says, "I first introduced some flies into the labellum thru the large upper opening, but they were either too large or too stupid, and did not crawl out properly. I then caught and placed within the labellum a very small bee which seemed of about the right size, namely, *Andrena parvula*, and this by a strange chance, proved to belong to the genus on which in a state of nature the fertilization of *C. calceolus* depends. The bee vainly endeavored to crawl out again the same way by which it had entered, but always fell backwards, owing to the margins being inflected. The labellum thus acts like one of those conical traps with edges turned inwards, which are sold to catch beetles and cockroaches in London kitchens. It could not creep out thru the slit between the folded edges of the basal part of the

labellum, as the elongated, triangular, rudimentary stamen here closes the passage. Ultimately it forced its way out thru one of the small orifices close to one of the anthers, and was found when caught to be smeared with the glutinous pollen. I then put the same bee back into the labellum and again it crawled out thru one of the small orifices, always covered with pollen. I repeated the operation five times, always with the same result. I afterwards cut away the labellum so as to examine the stigma, and found its whole surface covered with pollen."

We may further trace the extinction of our native Lady's Slipper orchids to their having to yield ground to the pressure of cultivation, and the presence of a dense population in sections of

From a painted photograph by the author

The Moccasin Flower growing in the woods

the country where at one time they were quite abundant; this coupled, alas! with the careless method employed by old and young alike in plucking the flowers in such a manner as to seriously injure the plants. I refer in particular to the method too often practised where whole armfulls of the flowers are torn up from the ground without regard to the future welfare of the plants. Often this is done thru sheer ignorance of the precepts governing the gathering of flowers. It is to be regretted, however, that more is not said and done toward giving advice and at the same time stimulating an interest among the school children towards conserving these beautiful and choice gifts of nature which we, her custodians, should hand down to those who follow in our footsteps.

C. pubescens has what Burroughs calls "a heavy oily odor" and is not so attractive in this respect as its smaller flowered sister *C. parviflorum*. This species tho rarer is more widely distributed thru North America according to Sir Joseph Hooker, who mentions without giving his authority, that "its rhizome or root-stock replaces the valerian as an anti-spasmodic in the estimation of Anglo-Americans." The musty smell possessed by many orchids, and used, it is supposed, to attract night-flying insects, is very noticeable in our Lady's Slippers, particularly in their roots. It is an earthy scent which one grows to like and to associate with nature, as he does the smell of a wood fire.

The Lady's Slipper

Where Cinderilla dropped her shoe,
'Tis said in fairy tales of yore,
'Twas first the the lady's slipper grew
And there its rosy blossom bore.

And ever since, in woodlands gray,
It marks where spring retreating flew,
Where speeding on her eager way,
She left behind her dainty shoe.

—*Elaine Goodale*

Bloodroot

The following two circulars are republished here at the request of Mrs. N. L. Britton.

Wild Flower Preservation Society of America

The following quotations are from the pledge of the New York State Conservation Commission:

"God has lent us the earth for our life. It is a great entail. It belongs as much to those who are to come after us as to us and we have no right, by anything we do or neglect, to involve them in any unnecessary penalties, or to deprive them of the benefit which was in our power to bequeath."—Ruskin.

We believe that "in a great democracy of free people, the protection of wild life and the preservation of all other natural resources, which under-lie national prosperity and happiness, must depend finally, as does the stability of the government itself, upon the support and willing service of every citizen."—Theodore Roosevelt.

Some of our beautiful native plants have been completely exterminated or are becoming very rare and their places being

taken by introduced weeds, This is due to various causes, but excessive picking and wanton breaking have contributed their share, by preventing many of them from forming seed. Collecting for commercial purposes has greatly decreased or exterminated many native plants.

Conditions vary in different localities, but it is safe to say that the early spring flowers, especially those that fade quickly, should not be picked in large quantities; particularly anemone, hepatica, dutchman's breeches, squirrel corn, adder's-tongue, blood-root, columbine, jack-in-the-pulpit. Lillies and orchids of all kinds, lobelias, gentians, trailing arbutus, azalea, mountain laurel, rhododendron, rhodora, dogwood, winterberry and holly also are becoming rare or extinct.

Plants that produce edible fruits which serve as food for the birds such as wild cherries, elderberries, dogwood, sumach, viburnum, spicebush, bear-berry, shad-bush, aralia and mulberry should also be protected or planted.

The following plants are often a nuisance: dandelions, buttercups, wild carrot, some of the clovers, daisies, both yellow and white, bouncing-bet, St. John's-wort, yarrow, tansy, boneset, sunflowers, golden-rod, asters; they are usually abundant in waste places and along roadsides and may be gathered in large quantities.

Some of our native plants such as: violets, wild geranium, roses, spiraea, clematis and most of the composites are often abundant and decorative in masses! But it is to be remembered that most garden flowers have been cultivated because they are good for decoration and do not soon fade and these should be substituted for the native plants whenever possible.

WILL YOU HELP TO PROTECT OUR NATIVE PLANTS?

Will you teach this A. B. C.?

(A) That what we have picked and carried away can no longer be enjoyed by anyone else in the place which they made beautiful.

(B) That although it is tempting and easy to pick a place clean of every wild flower growing there, we shall probably have a great many withered flowers by the time we reach home.

(C) That, worst of all, there will not be enough flowers left in that place to go to seed and make it beautiful again next year.

Our Christmas Greens

Beatrix Farrand

It is probable that few people realize how much widespread destruction our cheerful demand for Christmas greens entails; our Holly wreathes and Laurel and Ground-pine roping have meant corresponding losses to our woodlands. We are most of us to blame through ignorance because we do not know that one thin and poor yard of Laurel-roping uses up at least twenty growths of one year each, and that over thirty are needed to make the pretty thick strands we all have liked to buy. A good wreath of Holly is made up of fully thirty or forty of the finest young berried twigs of an average of two years growth. The cases of Holly sold in all the large florists' shops and markets at Christmas time measure approximately three feet long and two feet wide and at least two feet high; each of these boxes contain a minimum of six hundred years of growth. It is therefore not difficult to understand why Holly has been practically exterminated from the state of Connecticut and is growing difficult to find in New Jersey and nearby states.

The young sprouts of the Southern long-leaved Pine are also much used at Christmas and any of us who have tried to nurse an Evergreen back to shapeliness, which has lost its leader, knows what the loss of the principal growth means to a young conifer. *Abies balsamea*, the Northern fir, does not seem to be undesirable to use for our Christmas trees. It is beautiful in youth but short-lived and of little commercial value and is only fit for Christmas trees when grown in the open, as it rapidly loses its lower branches in the forest.

Our churches in the East use large quantities of Christmas egrens and occasionally one sees a shop, theatre or concert hall gaily wreathed with Laurel, Pine or Hemlock. The business of collecting these greens is growing each year; many country landowners are selling the right to get these materials and small armies of collectors come and cut and cart away cases and bales to supply our demands for decoration. We can each of us do our part toward decreasing the demand which has produced this reckless supply. It is going to be hard to find substitutes, but the Christmas destruction in our woodlands will largely cease if

we use more tubbed or potted trees and plants and more artificial leaves and branches which, although more expensive at the start, do not fade and have to be replaced each year.

We are each of us directly responsible for our share of this destruction, unless we know that the greens we have or buy come from carefully pruned shrubs or from plants especially grown for the purpose. Under present conditions we might paraphrase the familiar quotation by saying that our woodlands are being "butchered to make a Christmas holiday."

Reprinted by permission from the Bulletin of the Garden Club of America, May 1922, page 26.

A ROYAL FORESTER

Elbert Francis Baldwin of New York, one of the directors of the American Forestry association, makes a graphic report of his recent visit to the king of Italy, when he formally presented 5,000,000 Douglas fir seeds for the rehabilitation of Italy's forests destroyed during the war. The seeds were the gift of Charles Lathrop Pack of the association.

"One minute after I met King Victor Emanuel," writes Mr. Baldwin, "I forgot that I was talking to a king. He seemed a forestry expert, pure and simple. It had taken two months' hard work to obtain through our embassy, an audience with his majesty. But it was worth while, if for nothing more than to discover that, learned and experienced in many a department of science and government, Victor Emanuel was also up in forestry.

Planted Trees as Boy

"As a boy, he would plant young trees at his father's country places and rise at 4 o'clock in the morning to water the trees properly himself—and not merely see that it was done. 'In my own place, outside the city,' he added, I have grown foreign trees and I want to see how the Douglas firs will do there.' He told me of his success with varous trees and of his desire to extend the quantity and quality of tree growing.

"Italy's chief occupation is agriculture and the king is intensely interested in all things agricultural.

"As with all Italians, so Victor Emanuel's great regret is, as he said to me, the country's lack of raw materials. The American gift being in the line of raw materials, is therefore especially welcome to king and people. It should extend Italy's forest resources, it should ultimately add to her food supply, it should equalize the flow of brooks and rivers. In conferring these benefits on a foreign country, as his majesty pointed out, the American Forestry association is more than American; it has become international and its work is a model to the rest of the world."

Item from *Syracuse Post Standard*

The Mole

ADELINE M. WENGER

Teacher of Nature-Study, Riordan School, Highland, N. Y.

It was with the recollection of the story of Daniel Webster's eloquent plea for the life of the woodchuck caught in a trap by his brother, Ezekiel and their father's decision upon hearing both pros and cons for the sparing of that life, uttered in the words, "Zeke! Zeke! You let that woodchuck go!" that I determined to offer my plea no doubt less eloquent, though just as earnest, for the life of the mole. I can almost hear the "humph" of the farmer or gardener who may have read thus far. I know the objections you have to offer, but will you not bear with me for a brief space of time, and read this through? I feel that, with a fuller knowledge of the mole's life and habits, you will not be quite so rash in your destruction of this little underground dweller.

> Tell all your wise men, who pronounce me blind,
> My eyes are good tho small and hard to find,—
> Yet even so, serve better than their own,
> Else they had looked, nor said that I have none.
>
> —*Edith M. Thomas.*

Let us not alone look for the eyes of the mole, but *thru* them, and get an intelligent understanding of those "molehills" which disfigure our lawns and gardens, and so often seal the doom of this creature.

The Family Talpidæ, or moles, and their relatives of the family Soricidæ, or Shrews, belong to the order of mammals known as Insectivora, which name suggests the food upon which they mainly subsist.

Ernest Ingersoll, in the volume on Mammals, of his work, "The Life of Animals," tells us that there is direct and indirect evidence that the Order Insectivora can be traced far back to the age of Reptiles of the Jurassic period. One scientist, whom he quotes, says they are "little-altered survivors of some of the most primitive placental mammals." They failed to keep pace with the progress of other groups and today there are few representatives left. Those that have survived have done so because of special means of defense, as the hedgehog; or by living a sub-

terranean life, as the moles and shrews; or else by living in some far removed corner of the world where they have not yet been obliviated by their more intelligent enemies and rivals. It is still an undecided question whether the members of this order may not be descended from several primitive stocks, since they show such puzzling resemblances to other animals, like bats and lemurs, that it is difficult to correctly classify them.

We find members of this order in all parts of the world except Australia and South America.

The Family Talpidæ (Moles) includes 12 species, the individuals of which are larger than the Shrews.

We shall give most of our attention to the common mole of North America. This little mammal measures about 6-½″ in length. Its shape reminds one of a pointed, rounded wedge. The small pointed head unites directly with the thick body; the broad six-fingered "hands" of the forelimbs are furnished with spade-like claws and connected by strong armbones with the very strong ribs and collarbones; and the hind legs remind one of the legs of a mouse. The snout is long and pointed and the nose projects about half an inch beyond the mouth, ending in a hard, broad, flattened point. The mouth holds forty small, sharp teeth. External ears are lacking and the rudimentary eyes are small dark specks under the skin, the eyeball being but the size of a pinhead, only serving to distinguish between light and darkness. The posterior end of the body terminates in a short, naked, pinkish-white tail, which resembles an angleworm. Its beautiful soft, thick fur, a glossy, silvery gray, tinged with brown, varying in shade according to the light, lies equally well backward or forward.

In the western hemisphere this species is found only in North America, from southern Canada to the lowlands of Florida, but does not occupy any part of the arid region, including the Great Basin.

Anyone who possesses a garden or lawn, or is familiar with dry meadow land, (the most common habitat of the mole), must surely be acquainted with the tunnels of earth disclosing in an instant the highways and byways of this creature, and unless he has studied the habits of these animals of the ground, has very likely held an antagonistic feeling toward the little intruder, because without doubt the building of these passageways so near the

surface does not improve the appearance of a beautiful lawn or garden. But let us not judge rashly. Why does the mole build these tunnels, and especially, why does he build them so near the surface?

Let us trace the mole to his home and then follow him on his excursions.

W. F. Hornaday reports the observations of a farmboy, who uncovered and closely examined a mole-burrow two feet below the surface of the ground. It was a dome-shaped hole, reached from above by a slanting hole that ran down into its top. The burrow measured a foot in width at the bottom and from this three tunnels each about six inches long extended in different directions. A shelf near the upper portion of the burrow supported a mole on a bed of soft material.

Other observers have found a series of connecting galleries reaching from the bottom of the chamber.

> His home the mole makes underground,
> With runs and chambers crossed,
> And galleries circling round and round
> In which you would be lost.
>
> —*Thomas Miller.*

From this mole-burrow the hungry hunter follows regular tunnels which lead to his hunting grounds.

The strong tough bundles of muscles of his forearms and arms, and the well-braced ribs, greatly aid the work of the broad hands in digging thru the more compact soil to the looser soil near the surface. For the most part he simply crowds the loosened soil beneath him and pushes it behind him as he progresses, for he does not intend to return by the same route. Sometimes, when he finds the hard digging too prolonged, he comes to the surface and starts a new passageway, leaving a pile of loosened soil to mark his course. Since dawdling may prove fatal, he uses, (as recorded by one authority), but three seconds to bury his head, ten seconds to completely hide his body, and within three minutes time has succeeded in digging a tunnel one foot long.

Another observation recorded by W. T. Hornaday, extended over a period of 24 hours, during which time a mole worked undisturbed in a five-acre clover field. One hundred, four and one half feet of tunnels (68 feet of which were main line and 36-½

feet branches) showed the untiring efforts of this so-called "nocturnal creature," in procuring food.

It is in the loose soil near the surface that he finds the fat grubs and larvae that constitute so large a part of his diet. I regret that he must come so near the surface on his noonday excursions, tempted by his insatiable appetite to follow his special choices of food which are also moving upward. It is then that he is often caught by the enemy who accuses him of destroying his crops. This accusation is not altogether unjust for I must acknowledge that in his vigorous digging he breaks off tiny roots of grass and garden plants. But he does not feed on these, and since he does feed on the destructive grubs and insect larvae, many of which do attack the roots, I would beg you to stay the hand that has perhaps been too ready to deal the death-blow. Neither should the mole be branded "guilty" because you have not been aware that the field mouse finds his abandoned tunnel a convenient roadway to the grainfield where he finds the food he desires.

Occasionally the mole comes out upon the surface at night, perhaps to get a smell of the air above ground,—surely not to look about him, for his underground life has practically deprived him of the use of his eyes, the tiny remnants enabling him only to distinguish between light and darkness. It is his delicate olfactory organs that must guide him, and these tell him the presence of desirable food and of undesirable enemies.

As the frost enters the ground, this creature burrows deeper into the earth, but does not hibernate. Since it has been shown to be a fact that he cannot live without food for much longer than ten or twelve hours, he must continue his active life farther underground during the winter season. The larvae, grubs, and earthworms have also retreated below the frost line and their numbers must surely be greatly reduced by our friend with his enormous appetite.

This naked-tailed mole has near relatives whose names suggest certain of their characteristics.

The Hairy-tailed Mole, also known as Brewer's Mole, is found in Northern North America, southward to the mountains of New Jersey and the Alleghanies. It is smaller than the common mole, dark gray in color, has a longer tail which is thickly haired, but otherwise resembles its relative very closely in form and habits.

The Star-nosed Mole, considered one of the commonest of the Adirondack Region, is slightly longer than "naked-tail." The fur is dark, brownish gray above and lighter beneath, the long hairy tail resembles that of the muskrat and is used in swimming and the snout is remarkable in that it bears 22 fleshy points. It is found in the Northern part of North America, south through the middle states and in the mountains farther south. It prefers moist, swampy places and is often seen in the water and swimming under the ice in winter,—indeed it seems to like swimming as well, if not better, than digging. It has also been seen travelling over deep snow in winter, diving suddenly out of sight if danger is scented. This species seems to be more sociable than the common mole, since it lives in colonies believed to consist of perhaps twelve individuals. It feeds upon earthworms, aquatic and sub-aquatic insects, crustaceans, and grubs. One in captivity refused a wasp, a beetle, seeds, roots, and vegetable food, tho he ravenously devoured insects, worms, and even a deermouse larger than himself.

The Oregon Mole, found in forested regions and in open valleys, is the largest and handsomest in North America, and perhaps in the world. It bears a blackish fur which has a purplish sheen, the size and beauty of which has made it of value in the commercial world. Since in parts of the cultivated areas it is considered a pest, because of the dulling of the knives of mowing machines as they strike the numerous mounds of earth left by these creatures, and the disfigurement of lawns,—the numbers will no doubt be kept down by trappers who will take advantage of this opportunity for supplying commercial demand, which is very great if we may judge by the report of a Brooklyn dealer who stated that he had dressed four million imported European skins in 1916. I trust that wanton destruction will not be the result of what is deemed an important measure to control serious injury to crops.

The common Mole of Europe is distinct from, but closely related to the North American species, gathers in colonies, and builds more intricate homes. One German naturalist believes he has evidence that the European Mole stores worms for the winter, biting off their heads so that they may not crawl away.

The mole is unknown in Ireland, but is found in England, Asia and Japan.

The Golden Mole of South Africa has a fur with a beautiful metallic lustre from which it derives its name.

It may be of interest to stop here to mention the great ferocity displayed by this little creature. Two moles held in captivity were observed to fight furiously, the battle terminating in the weaker combatant being devoured by the stronger. In speaking of this noticeable trait, someone has said that were they as large as lions their ferocity would be more terrifying than that of any other creature.

The number of litters produced during a year seems to be a disputed question. Some authorities claim there is but one; Merriam believes there are two or more. Nests have been found to contain from one to six young. The young of the Oregon Mole are born in March and grow so rapidly that by May they can hardly be distinguished from the adults and are already working in tunnels.

I trust that this discussion of the characteristics and value of this interesting animal will not fail to have the desired effect of removing any unworthy prejudice you may formerly have held. Do not condemn the mole unless you can prove him guilty. You, yourself, would not wish to be condemned to death on "circumstantial evidence," so give the mole as fair a chance, remembering:

No single thing did God create,
But he for it gave food,
And whether it be small or great,
"He saw that it was good."

—*Thomas Miller*

Society for the Preservation of New England Plants

A Society for the Preservation of Native New England Plants has been formed under the auspices of the Garden Club of America and the Massachusetts Horticultural Society.

Its object is to encourage and educate the people of New England to protect native plants and wild flowers from destruction, to only cut them with care and discrimination, leaving the rarer species to multiply themselves, and to spread a knowledge of their habits and cultural requirements among the community at large.

This Society plans to provide free lectures, hold exhibitions, plant wild flower sanctuaries, and to spread knowledge and love of wild plants, believing that once the people have learned about them they will become their guardians and stop their rapid extermination.

At present the native Laurel is in great danger, being used in immense quantities in decorations at all seasons of the year, but especially at Christmas time. It is gathered in September when the new growth of the year is taken and in New England motorists

have already destroyed great quantities of this, one of the most beautiful shrubs in America.

Many wild flowers which twenty years ago were common are now seldom found, and unless the people are willing to protect rare and easily exterminated species they will soon be lost to New England. For example, the Magnolia or Sweet Bay has from over picking practically disappeared from the swamp in the town in Essex County, Massachusetts, to which it gave its name and which was the only place in New England where this fragrant flower grew naturally.

Every one interested is invited to become a member of this Society.

For further information apply to

Mrs. S. V. R. Crosby

Care of Massachusetts Horticultural Society, 300 Massachusetts Avenue, Boston 17, Massachusetts.

The following circulars are published and sent out by the Society for the Preservation of Native New England Plants, Horticultural Hall, Boston, Mass.

How Teachers Can Help the Wild-flowers

Among the many groups of persons coming into close contact with the important problem of wild-flower preservation, none has perhaps a greater chance to help in its solution than have the teachers in the American schools. The development of the public opinion of the next generation is in their hands, and the awakening of a wide ideal of the conservation of our natural forms will be, or should be, one of the corner stones of this public opinion. While the needs of conserving our forests and our wild life are more generally obvious than the need of protecting some of our vanishing wild-flowers, they are not more real. Every teacher can take as a text the little bunches of spring blossoms, with their little wilted faces pressed closely together, which favorite pupils bring to their desks on May mornings, rivaling one another as to who can gather the biggest bunch; they can explain the characteristics of the different kinds of flowers, because of which certain kinds, like the arbutus, should never be picked at all, while others may be picked more freely; they can tell why some kinds of flowers are never seen any more near large cities and are seen less plentifully even in some country districts; they can warn children

not to destroy whole beds of anemones and hepaticas to make the bunches that ought never to be sold to the motorists. There is so much to tell, and so much to learn about conditions in every locality.

Teachers can get general information by writing to the above address.

How Children Can Help the Wild-flowers

Children all love the wild-flowers; but they do not usually realize how much some kinds of flowers need their care. Children go on picnics and see what large bunches of the prettiest flowers they can pick which are wilted and thrown away long before they reach home. Some kinds of flowers are dying out in certain places just because they are picked in this way, so that none can go to seed. All children should know the trailing arbutus, and the fringed gentian, and the scarlet cardinal flower; but they should know that these flowers are particularly delicate and not to be picked, no matter how pretty they look and how much the children want to make big bunches for their parents or teachers. Many other flowers grow much more freely and can be picked. Children should ask their teachers to tell them about the different needs of the different kinds of flowers, and if the teachers have not studied about the subject they can get a great deal of information by writing to the Society.

How Motorists Can Help the Wild-flowers

The ultimate fate of the varieties of wild-flowers which are threatened with extermination lies with the motorists. Other causes combine to hasten this process near the centers of population, including the picking by school children and holiday makers; but the motorist alone goes far afield to the natural reservoirs where enough seeds might still be grown and disseminated to counteract the diminution of the supply near the cities. In the remoter country districts the flowers are in small danger of being intensively picked by the rural population. There are enough and to spare. But the motors bring countless pickers, of every grade of science, eager to seize every rarity they see. The complete disappearance of conspicuous varieties from the more traveled highways is proof sufficient of the crying need of a better understanding of conditions by the motorists. There

are flowers to be picked and others not to be picked, and only study can differentiate between them. A wider knowledge of these differing conditions will add very much to the enjoyment of motoring, because knowledge always adds to the enjoyment of a subject. There is much information available, and bulletins may be secured from the Society.

How Everyone Can Help the Wild-flowers

The adequate protection of our wild-flowers so that a sufficient supply will be preserved for the enjoyment of future generations depends today on cooperation by everybody. There must be developed a general understanding of what the needs are. Local organizations, where they exist, can answer questions about local needs. Where they do not yet exist, friends of the wild-flowers should combine to organize them. But there are some general rules which should be universally followed. One of these is moderation. Never gather too many flowers of one kind in the same locality, however common it may appear. Another rule is to pick the rarer perennials with care. If the roots come up easily when you pull them, like those of the blue bells, always use a knife or scissors, so that the plant may come up another year even if you have taken away the source of the seeds. Flowers not perennial, like the fringed gentian, should be picked very sparingly, if at all, because the supply of seeds is the only hope of the colony for the future. Use judgment. Do not wipe out roadside colonies, even of plentiful varieties, for picking is always more intensive near the highroads where many motors pass. Be willing to use occasional complete restraint in the case of especially rare flowers, such as the orchids and the arbutus. Learn all you can by studying local conditions.

Flowers Needing Protection

This Society has been asked frequently for a list of wild flowers which need special protection, that is, which should never be picked except in very important cases and then only sparingly and with great care. After consulting many authorities they submit the following names to go under the heading of

FLOWERS THAT SHOULD NOT BE PICKED:

Trillium	Trillium grandiflorum
	" cernuum

	Trillium undulatum
Cardinal flower	Lobelia cardinalis
Columbine	Aquilegia canadensis
Mayflower	Epigaea repens
Gentians	Gentiana crinita
	" puberula
	" Andrewsii
Hepatica	Hepatica triloba
Bloodroot	Sanguinaria canadensis
Spring beauty	Claytonia virginica
Lilies	Lilium philadelphicum
	" superbum
	" canadense
Pitcher plant	Sarracenia purpurea
Dutchman's breeches	Dicentra cucullaria
Fringed polygala	Polygala paucifolia
Dog-tooth violet	Erythronium americanum
Yellow violet	Viola pubescens

All orchids, especially the following:

Yellow lady's slipper	Cypripedium pubescens
" " "	" parviflorum
Showy " "	" hirsutum
Pink " "	" acaule
Green wood orchis	Habenaria clavellata
Green-fringed orchis	Habenaria flava
Yellow-fringed orchis	" ciliaris
Hooker's orchis	" Hooker
Ragged-fringed orchis	" lacera
White-fringed orchis	" blephariglottis
Large purple-fringed orchis	" fimbriata
Small " "	" psycodes
Grass Pink	Calopogon pulchellus
Indian "	Arethusa bulbosa
Snake-mouth	Pogonia ophioglossoides

Nodding pogonia	Pogonia trianthophora
Whorled pogonia	" verticillata
Showy orchis	Orchis spectabilis
Rattlesnake plantain	Epipactus pubescens
Ladies tresses	Spiranthes cernua
Slender Ladies Tresses	" gracilis

Yellow Fringed Orchis

ROBERT SPARKS WALKER

In meadows damp and barrens wet,
From one to two feet high;
I am the sweetest orchis met,
With orange-yellow eye.

My slender, lance-shaped leaves grow less,
As they approach the spike,
That holds my golden showy dress,
That grows beside the dike.

My petals, narrow fringed, and lip,
All deeply fringed are found;
With ovate sepals o'er which trip,
Wee fairies homeward bound!

All slender, long's my flower spur,
And anther cells at base,
Are widely separated, sir;
Adds beauty to my face.

July and August when you see,
My blooms with open eye;
You'll be quick to look at me,
For none can pass me by!

White Pine

The Pine

HENRY KLEIN

Brooklyn, N. Y.

One impulse from a vernal wood
May teach you more of a man,
Of moral evil and of good,
Than all the sages can.

—*William Wordsworth*

Tree friendships are very precious things. John Muir, writing among his beloved trees of the Yosemite Valley, adjures his worldweary fellow men to seek the companionship of trees.

"Go learn how they live and behave in pure wildness, to see them in their varying aspects thru the seasons and weather, rejoicing in the great storms, putting forth their new leaves and flowers, when all the streams are in flood, and the birds singing, and sending away their seeds in the thoughtful Indian summer,

when all the landscape is glowing in deep, calm enthusiasm—for this you must love and live with them, as free from schemes and cares and time as the trees themselves."

The beautiful Pines have something, have everything to teach us, especially at this time of year. So away to the Pines we shall go (for a cat may look at a king), eyes and ears alert. But let us equip ourselves on our way with some interesting facts about the Pines which they in their modesty may refuse to reveal.

The pines are evergreens, or Conifers. The distinguishing feature of this great tree group is the cone-bearing habit. The overlapping scales of the cone are attached to a central stem, and each scale bears one or more naked ovules when the time of flowering comes. A little detail about the cone and the pistil of the evergreens, is very essential here.

The Pine family and its relatives are characterized by the simplest, yet most peculiar kind of pistil. This pistil is gymnospermous, or naked-seeded. The counterpart of the ordinary pistil is angiospermous, meaning that the seeds are borne in a sac or closed vessel. Accordingly the pollen can act upon the contained ovules only indirectly, thru the stigma.

While the ordinary simple pistil is conceived by the botanist to be a leaf rolled together into a closed pod, those of the Pine, Larch, Cedar and Arbor Vitae are open leaves, in the form of scales, each bearing two or more ovules on the inner face, next the base. At the time of blossoming, these pistil-leaves of the young cone diverge, and the pollen so abundantly shed from the staminate blossoms, falls directly upon the exposed ovules. Afterwards the scales close over each other until the seeds are ripe. As the pollen acts directly on the ovules, such pistil (or organ acting as pistil) has no stigma. When ripe and dry, the scales turn back or diverge, and in the Pine the seed peels off and falls, generally carrying with it a wing, a part of the lining of the scale, which facilitates the dispersion of the seeds by the wind. The fertile scales are favorably situated near the middle of the cone. Here the best seeds are found. The terminal scales crowd at both ends of the cone, and their seeds usually fail utterly or are stunted in development.

So much for the family. It is obvious that if the whole is interesting, its aggregate parts must be. On the genus Pinus let us now center our attention.

B. E. Fernow says: "What the apple is among the fruits, what the oak is among the broad-leaved trees of the temperate zone, the pines are among the conifers, excelling all other genera in this most important family in number of species, in fields of distribution, in extent of area occupied, in usefulness and importance to the human race."

For whatever reasons we may revere the pines at least the fact that they are connecting links with the past attracts us to them. Mrs. Anna Botsford Comstock expresses this appeal most pleasingly. "Their dark foliage outlined against wintry skies appeals to the imagination, and well it may, for it represents an ancient tree-costume. The pines are among the most ancient of trees, and were the contemporaries of those plants which were put to sleep, during the Devonian age, in the coal beds. It is because the pines and the other evergreens belong essentially to earlier ages, when the climate was far different than it is today, that they do not shed their leaves like the more recent, deciduous trees. They stand among us, representatives of an ancient race, and wrap their green foliage about them as an Indian sachem does his blankets, in calm disregard of modern fashion of attire."

Six hundred species and varieties have been described and named in the genus Pinus. They are distributed in vast forests over the northern half of the globe, reaching into the tropics by following mountain chains. The East and West Indian Islands have each their own pines. Out of the hundreds of named kinds about eighty distinct species are now recognized. Half of this number are found in North America. Forests of pines still cover mountain slopes on the western and northern parts of the continent. Lumbering has been going on for a century in the Eastern States; more recently the Great Lakes region and the pine forests of the Southern States have been exploited to supply the demand for pine.

The foremost lumber trees in this country, pines have still other important uses. They offer a great variety of trees for protection and ornamental planting. Wind-breaks from the seashore to the semi-arid prairies, from the low seaboard plain to the mountain's crests, may all be of pine. Arid soil or rich, cold or warm climate, swamp and desert sand—all offer congenial conditions for some native pine. In the parks of cities, in private grounds of the rich and the poor, pines are planted for shade and shelter and orna-

ment. Only in very smoky cities, St. Louis and Pittsburg, for instance, do pines and other conifers decline after a few years of growth. It is believed that sulphur and other substances in the noxious gases that constantly pour from great chimneys choke the evergreens. Nobody is able yet to give a final answer to the question.

The by-products of pine trees include oil, pitch, turpentine, and rosin, products of the resin that impregnates the wood of pitch pines. Minor products are the seeds of the nut pines, used as food; pine wool, spun from the leaves of certain species; and pine shoots used for Christmas decorations.

All pines are evergreens and cone bearers. They are distinguished from other genera of the family Conifera by bearing their needlelike leaves in clusters of one to five leaves, each of which is enclosed at its base by a sheath made of popery scales. No other conifer has this sheath. The soft pines, so called from their soft, light wood, shed their leaf sheaths as soon as the young leaves are fully developed. The pitch pines, so called because their heavy, dark-colored wood is full of resin, retain the leaf sheath until the leaves are shed. The number of leaves in the bundle helps to determine the tree. For example, the white pine has five needles in each bunch, the pitch pine has three, while the Austrian pine has two. The first two we shall endeavor to study.

The White Pine (*Pinus strobus, Linn.*)

The white pine is the most beautiful of trees. The fragrance of balsam, the freedom of the atmosphere seems to come to our nostrils with the very name of a pine; but there are few among them that can claim as much admiration as the white pine. Much of the peculiar charm which distinguishes our scenery from that of other lands is owing to its great whorled branches which stand out regularly against the sky. Thruout the winter how magnificent is this living creature of the forest, when it stretches out its arms to uphold the snow and ice that bend them without mercy to the ground. And how must it be thrilled with delight as it is touched with the soft air of spring which lovingly dries its needles by fanning them in its breezes. Then as the silver sheen of their underside passes thru the hazy blue of its green, Thoreau describes the effort as similar to that of cold flashes of electric light.

In the East the White Pine with its fine, tasseled foliage grows often 150 to 200 feet in height and reaches an age of from two to three hundred years. It is a stately tree, conical, with spreading horizontal branches in whorls of five. The bark is grey, furrowed, thick, with broad scaly ridges. Like other pines, the white pine bears its evergreen leaves in sheathed bundles set on little projecting shelves along the twigs. The sheaths are shed in spring in all the white pines, and the number of leaves in a bundle is always five. In our Eastern woods a five-leaved pine is a white pine whether it is a flourishing little sapling with only three or four whorls of branches coming out from its central stem, or a great forest tree towering above its broad leaved neighbors, noble and picturesque, tho storms have disturbed the symmetry of its youth. Certain pitch pines, all Western, have leaves in fives, but the sheaths will be found at the bases of the bundles thruout the season.

Stroke the leaves of a white-pine branch—they are soft and flexible. As they sway in the wind they are graceful and light; the tree seems decked with plumes of dark blue-green. The young shoots, pale yellowish green, lighten the sombre pine woods, and the clustering catkins, shaking out their abundant pollen, sift gold dust thru the whole forest. The pistillate flowers show themselves clustered about the terminal bud, which keeps on growing, leaving them to ripen, thru two seasons into long, slender green cones. The pinkish purple of these tiny cone flowers adds a rich color to the upper twigs, where they stand erect until autumn. Below them, hanging down with their weight, are the half-grown cones, slim, finger-like and green, with tight, smooth scales, that will turn brown and discharge their ripened seed at the end of their second summer.

This white pine of ours is built on a semi-decimal plan, which it is worth our while to notice. In the gracefully winged seed there are ten cotyledons, or seed leaves, that mount the stem and surround the precious terminal bud when the seed germinates. This bud is the "leader." If anything happens to it the central shaft is maimed for life, and either one side bud will have to bend upward and take the leader's place, or two will divide the honor, and a forked pine is the result.

The buds on the crown of a baby white pine cluster at the top—a circle of five around the central bud. In spring the leader grows

upward, and at its base five branches radiate. The next year the crown repeats the same story, and the tips of the side branches divide and elongate in the same way. The best growth is generally made by the crown buds in the very top of the tree. So it happens that we may count the years of our sapling by the whorls of branches it bears. In the early years the growth is beautifully symmetrical, if there is room for sun and air to reach the little tree. Later the branches crowd each other, and some are killed. In deep woods where trees interfere, the stems are bare of living branches almost to the top.

This is the lumberman's pine, a tree whose limbs die so young that there are practically no big knots in the lumber. He cuts clear beautiful boards out of such a tree, and there is very little waste. Or he squares the trunk for a big bridge timber whose value and strength would be greatly lessened by large knots.

The great pine forests of lower Canada and the Northern States seemed inexhaustible to the early settlers. New York and Pennsylvania had pineries that promised a lumber supply for generations to come. But alas! Their doom seems inevitable and near.

To quote Ruskin from "Modern Painters" is at this point most appropriate,

"I wish the reader to fix his attention for a moment on these two great characters of the pine, its straightness and rounded perfections; both wonderful, and in their issue lovely. I say first its straightness. Because we see it in the wildest scenery, we are apt to remember only as examples of it those which have been disturbed by violent accident or disease. Of course such instances are frequent. The soil of the pine is subject to continual change; perhaps the rock in which it is rooted splits in frost and falls forward, throwing the young stems aslope, or the whole mass of earth around it is undermined by rain, or a huge boulder falls on its stem from above and forces it for twenty years to grow with the weight of several tons leaning on its side.

"Nevertheless this is not the truest or universal expression of the pine's character. The pine rises in serene resistance, self-contained; nor can I ever without awe stay long under a great Alpine cliff, looking up to its great companies of pines.

"You cannot reach them; those trees never heard human voice; they are far above all sound but that of the winds. No foot ever stirred fallen leaf of theirs.

"Then note, farther, their perfectness. The pine stands compact, like one of its own cones, slightly curved on its sides, and, instead of being wild in its expression, forms the softest of all forest scenery. For other trees show their trunks and twisting boughs; but the pine, growing either in luxubriant mass or in happy isolation, allows no bough to be seen. Lowland forests arch overhead and checker the ground with darkness; but the pine, growing in scattered groups, leaves the glades between emerald bright. Its gloom is all its own; narrowing to the sky, it lets the sunshine strike down to the den.

"And then I want you to notice in the pine its exquisite fineness. Other trees rise against the sky in dots and knots, but this in fringes.

"You never see the edges of it, so subtle are they; and for this reason it alone of trees, so far as I know, is capable of the fiery changes noticed by Shakespeare.

"When the sun rises behind a ridge crested with pine, provided the ridge be at a distance of about two miles, and seen clear, all the trees for about three or four degrees on each side of the sun become trees of light, seen in clear flame against the darker sky, and dazzling as the sun itself.

"I thought at first this was owing to the actual lustre of the leaves; but I believe now it is caused by the cloud dew upon them, every minutest leaf carrying its diamond. It seems as if these trees, living always among the clouds had caught part of their glory from them."

The Pitch Pine (*Pinus rigida, Mill.*)

The pitch pine carries picturesqueness to extremes, and becomes in old age grotesque, even absolutely ugly. It has the look of a tree that has been hounded by untoward circumstances. In youth the tree has a rounded symmetrical head, formed of successive whorls of branches. In its subsequent struggles symmetry is lost, and the contorted limbs, tufted with scant sickly-looking foliage, and studded with the squat, black, prickly cones of many years, reach out with an expression of mute appeal that tempts one to cut the tree down and end its sufferings. If it is cut, however, it sends up suckers from the roots, a strange habit among the pines; and its winged seeds spread the species over barren and shifting sand dunes, and otherwise hopelessly treeless

areas. This work is so well done on the island of Nantucket and the desert soil of Cape Cod, even those areas which are washed by the spring tides, that the pitch pines have earned the regard of men. Its light, reddish-brown timber is coarse and of slight value, but this is forgiven.

Pitch pines are rich in resin; the knots especially accumulate it, and "pine knots" and "candlewood" are useful and familiar household words in the regions where the pine grows. Kindling wood and torches for midnight coon hunts are never wanting. The resin is not the sap of the tree, as is generally supposed. Pine sap is like other sap; the resin is a product of certain glands of the tree, and is of great use to it in closing wounds and thus keeping out the spores of destructive fungi. It is this effort of the tree to heal its wounds that makes it pour resin into the cuts made by the turpentine gatherers. This resin is taken to a distillery, where the turpentine is given off as a vapor and condensed in a coiled tube which is kept cold. What is left is known as "rosin."

The "pitch is kindle of substance" which makes handling of the sticks unpleasant business for tidy folks, gums the saws and makes trouble in the mills. Sills and beams of houses were formerly made of pitch-pine logs but now other kinds are preferred, and these trees go into charcoal and fuel. The turpentine gatherer, too, has left these trees to seek the richer pineries of the South and West. There is small excuse for the pitch pine to stay on, were it not for the one thing it does better than any other—it makes glad the wilderness and the solitary place.

The characteristics of this pine, in a few words, are these: A gnarled, irregular tree 50 to 75 feet high, with short trunk and rigid, rough branches. Bark thick, broken into plates by deep, irregular fissures, scales thin; bark red or purple. Wood light red, soft, durable, brittle, coarse. Leaves in threes, rigid, stout, 3 to 5 inches long, dark yellow-green; sheaths becoming black, persistent. Flowers monoecious; staminate short, densely clustered at base of season's shoot; pistillate lateral, in clusters, rosy tinged, oval, short, stalked. Fruits biennial, 1 to 3-½″ long, ovate, scales with sharp, recurving beaks. Preferred habitat, sandy uplands and cold swamps. Distribution, New Brunswick to Georgia; west to Ontario and Kentucky.

On February 27, 1855, Thoreau wrote in his journal: "A week or two ago I brought home a handsome pitch pine cone, which had freshly fallen and was closed perfectly tight. It was put into a table-drawer. Today I am agreeably surprised that it has there dried and opened with perfect regularity, filling the drawer, and from a solid, narrow and sharp cone has become a broad, rounded, open one, has in fact expanded into a conical flower with rigid scales and has shed a remarkable quantity of delicate winged seeds. Each scale, which is very elaborately and perfectly constructed, is armed with a short spine pointing downward, as if to protect its seeds from squirrels and birds. That hard, close cone, which defied all violent attempts to open it, and could only be cut open, has thus yielded to the gentle persuasion of warmth and dryness.

"The expanding of the pine cones, that too, is a season."

The Honey Bee

Wm. Prindle Alexander

Flashing vision of buzzing brightness,
Animate miracle of beauty,
Living dream of fairy-lightness
Fleet-winged bee,
Free-lance with no other duty,
Than to sally forth for booty,
O'er the summer lea.
Oh! beautiful, when brightly banded golden
She probes the pendant mass of linden bloom,
Or flashes on with precious riches rolled in
Tiny baskets, or perchance hangs over
Banks of soft perfume,
Where grows the peerless, nectar-yielding clover.

Ever going, ever coming
With a glad symphonic humming,
On her iridescent wings
That rejoice with song untiring
Full and free
As the springtime robin sings.

So the bee
Bears off her booty, straight without inquiring
In ethical propriety.
Into the sea of bloom, just buccaneering
She goes unfearing,
And all sweet spoil makes gladly her possession,
Or cares a fig if this be thought transgression.

Oh! beautiful bee, Carniolan, Caucasian,
Italian, or bee from the land of the palm,
Partake of the nectar and harvest the balm,
Come, and no hand shall resist your invasion.
From May to October hum
Over the scented lea,
Come with your frolicsome,
Gladsome, contented glee.
Come, with the shine, and the color and glow
Of spring's fairest day,
Until the soft bloom of the golden rod blow
Honey bee stay.
Oh! happiest rover,
Careering sweet comer,
Bright knight of the clover
And soul of the summer!

A Question of Relationship

I. R.

The earthworm, though it was quite pained
On being cut in two,
Shed not a tear in vain regret,
As fool things often do,
But prompt began his parts to mend,
Without a great ado,
And very soon the earth was blessed
With not one worm, but two.

For only tail the head end lacked
To make it whole again,
And only head the tail end took
With segments and a brain.
Now when they meet in daily toil
They quarrel not, the twain,
Nor try to settle which is who,
For, clearly, 'tis not plain.

Two Yosemite Nature Guide Bulletins

YOSEMITE NATURE GUIDE MOVEMENT. UNDER COOPERATION OF FEDERAL AND STATE GOVERNMENTS.

AUDUBON WARBLER NESTS IN YOSEMITE

Walking to work in almost any California town on a winter's morning, one may be surprised to see a bird which resembles much a sparrow. It has a flash, however, as it flies, of canary yellow on the back between the wings. In fact it has five yellow spots, one on the crown, one on the throat, in front of each wing, and on the rump. Looking more closely the observer notes that it has not the short stout seed-crushing bill of the sparrow tribe. On the contrary it has the sharply pointed bill of the insect eater. Studying it further, one sees that although a warbler, it has the flycatcher habit of feeding on the wing. This feathered friend is the Audubon warbler. It ranges from British Columbia to Guatemala.

After years of acquaintance with it in its winter garb, busily cleaning up the insects, one is hardly prepared to see our Audubon warbler in his full glory in nuptial plumage in Yosemite National Park. Like a farmer lad who has doffed overalls and jumper to don his best for the schoolhouse dance, so our energetic Audubon has shed his dull winter coat for a brightly colored one. He is bedecked with gorgeous gold of the brilliancy, so dear to ancient Aztec rulers that they used similar shades for the wonderful royal featherwork robes of which perhaps only two, in European museums, still exist.

Some Yosemite visitors fail to recognize the Audubon warbler. Anyone troubled about bird identification can find a solution of his problem given gladly and without cost, at the Nature Guide office in Yosemite Village. This nature guide service is the outgrowth of studies of Norwegian and Swiss resorts by the World Recreation Survey. The experiment was first undertaken in 1919 at Lake Tahoe. It proved so attractive that business men even deserted trout fishing for nature guide hikes. Coming under the observation of Director of National Parks Mather, the work was expanded into Yosemite National Park under the joint auspices of the California Fish and Game Commission and

of the National Park Service. It served in 1920, 27,047 visitors. In 1921 more than 50,000 visitors were aided. Dr. H. C. Bryant, Game Expert of the Fish and Game Commission, will again be in charge.

THE COYOTE, THE INDIAN'S IDEAL OF SAGACITY

Berkeley, May 31st: No animal has entered so largely into the folklore of the western Indian as has the coyote. It was Mr. Coyote who did most of the worthwhile things, brought fire to the earth, rescued those in distress, and ruled over the destiny of both man and beast. Furthermore, the coyote was the forerunner of the Indian's domestic breed of dogs. The white man also classifies him as the most sagacious and intelligent of the western wild folk. A resident of both the plains and the mountains, the coyote attains his greatest development in the higher altitudes, as for instance, in Yosemite National Park, where the nature guides occasionally have the chance to point out this member of the dog family, or call attention to its weird howl. The mountain coyote is often of such size as to be called a wolf but this larger cousin of the coyote is yet to be taken within the borders of California. The coyote furnishes a subject for some of the lectures and campfire talks of the nature guides who, under the auspices of the National Park Service and the California Fish and Game Commission, tell vacationists of the more interesting forms of life, and who lead nature-study field classes where nature is studied first hand. The summer of 1922 will be the third season of the Yosemite Free Nature Guide Service, a service which has proved so popular that it has been extended to two other national parks.

The Song-sparrow or Humility Rewarded, a Fable

Amelia J. Calver

Lebanon, N.Y.

One beautiful morning in spring, many many years ago before you or I, our mothers, grandmothers, or great grandmothers even thought of living, there might have been seen gathering from all parts of the world, silent bevies of birds of all kinds and sizes, to a beautiful island fanned by the spice-laden zephrys of the far famed East.

But why this gathering?, you ask; why this silence? when in our day a single robin will call us from our deepest slumbers, and a few bluebirds and sparrows make the morning so resonant with sound, that we wonder what we ever listen to when the birds are gone.

Well this is just what I am going to tell you. Birds had not at that early period learned to sing and it had been announced sometime before by Dame Nature that when the magnolia should send its perfumed breezes throughout the verdant isles of the Tropics the Fairy Queen of Song would meet the birds there to distribute her gifts.

Earliest among the expectant guests, was seen the stately flamingo whose lordly bearing seemed to claim the richest gift of all; while the gaudy peacock flaunted his tail in the rays of the morning sun, building airy castles of the expected admiration he was sure to earn when he should call attention to the beauty of his plumage, by the sweetness of his song. Among the waving branches of a lofty tree, sat a bird of paradise, silent thro' envy, wondering how birds who tread the earth, could expect to rival those who were free from such drudgery and could move at pleasure on downy pinions.

In the midst of these gay dreams and while the less pretentious birds were chatting in undertones, a slight rustle was heard in a cluster of spice bushes which the birds thought could be no other than the Fairy Queen herself, and eager to be the first to greet the royal donor, the flamingo rushed into the bushes, followed by the peacock, while the bird of paradise came down from his lofty perch with a graceful sweep, only to prove to her highness that un-

like the rest, he was an inhabitant of the upper air. But what was their surprise and chagrin to meet only a poor little plain sparrow, quietly making its breakfast of the tender blossoms of the clove tree.

"What audacity" said the flamingo, "to think such a mite as you, should venture into the company of your betters, unasked."

"Ha! ha!" laughed the proud peacock, "a pretty figure you would cut singing in a blossoming tree in that quaint little drab coat of yours."

"I wonder if it has invited its cousin the toad," said a swan just arriving from a lake in the interior of the island. "I could find none for my breakfast this morning; I presume they were arranging their toilets by swallowing their old trousers and putting on tights. Well, well, when the toad-and-sprarow concert comes off, I hope I shall receive an invitation," continued the swan, arching his neck to look at the rest of the company to make sure of their approval of his wit; "for I shall like to be spared the trouble of hunting for my breakfast."

"I thought," said the timid little sparrow, "that *all* the birds were invited, and I ———"

"All the *birds*," exclaimed the bird of paradise, "You a bird? Well I should think so! Look at *me*, is there any resemblance between us? I should think you were more a frog or a beetle than anything else."

"Come, come," said the peacock, "we cannot have such a nuisance on the ground when our queen arrives. She would be disgusted and leave us immediately."

"Here's your breakfast, Mr. Swan" said the flamingo, reaching up his long neck and, taking the poor little bird in his crooked bill, threw it on the ground near the swan, at which the peacock fearing it would get away, rushed up and placed his foot upon it.

Just at this crisis, who should descend into their midst but the Fairy Queen; and seeing so small a bird in trouble, carefully picked it up and folded the trembling little thing to her bosom.

At this the belligerents in the foreground immediately fell back to a respectful distance and when quiet was restored, the queen said, "I have been a witness of all that has taken place here this morning. I came early to learn for myself to whom the gift of song would be appropriate. Your majesty, said she, turning to the flamingo, shall only bear from this place the mark of your

shame," at which the flamingo, blushing a deep scarlet all over, retired into the background.

The swan fearing its turn was coming next, turned white with fear, but the fairy only cast a reproachful look at him, saying, "Glide on proud swan, but at your last moment you will realize the treasure you have lost."

The peacock hoping to dazzle the queen by his grandeur was slowly turning his wide-spread tail before her, but she only pointed with disdain to the foot from which she had rescued the sparrow, and the peacock looking down immediately dropped his plumage.

"Thus ever shall it be with you," said the Queen. "The remembrance of your cruel act shall bring down your pride." "And to you proud bird of paradise shall be added nothing but discordant tones. You already have enought to feed your self-conceit."

Then touching the poor little sparrow with her delicate wand, it immediately opened its little beak and poured forth such a melodious lay that the Fairy herself was delighted.

Hearing this the other small birds who had kept at a respectful distance, lost all fear and perched confidingly on the Fairy's head and shoulders uttering their joy in all the varied songs we now hear from birds on a beautiful spring morning.

And when they had sung their sweetest thanks to the kind fairy and the little sparrow had given the grand finale with its "sweet, sweet, sweet," promising to care for and protect one another, they went back to their homes, a joy to themselves and a delight to the world forever.

Thus we see that pride is its own destroyer, and humility obtains its own reward.

O wise little birds, how do ye know
The way to go
Southward and northward, to and fro?

Far up in the ether piped they,
"We but obey
One who calleth us far away."

—*H. McE. Kimball*

THE
NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN ELEMENTARY SCHOOLS

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Editorial

Conservation and Nature-Study

It is interesting to note the growing national necessity of the proper teaching of Nature-Study to the youth of the land. Owing to the efforts of Nature lovers and wise legislation, the United States has become a shining example to the world in the setting apart of great tracts of wild land for permanent parks. Not only has the National Government established parks covering vast areas but many of the states have done likewise. This great movement has resulted in a pressure from above for Nature-Study. The keeping wild and natural the thousands of acres of our beautiful forests and lake regions, and the conservation of wild life there will prove to be a futile effort if the people to whom the parks belong have no intelligent interest in them.

How can the ignorant know the proper way to treat a wild park, to say nothing of appreciating its true beauty! The general use of the automobile, the rapidly growing habit of taking long trips in autos with tents render the whole question a pressing one. The Nature-Guide movement on the Pacific coast is one means of teaching the proletariat as well as the patricians how to see what is before their eyes and how to care for the preservation of wilderness charms. The foresters employed by the Federal and State Governments are doing a great work also, but unfortunately there are not enough foresters to stand guard everywhere.

The sure way to protect our great reservations is to train the children in the public schools through Nature-Study to understand and know the plants, trees, animals and birds that inhabit these reservations and thus will they learn to respect their rights as well as to understand what the rights are. It has taken Dr. Horn-

aday, a most intimitate student of wild animals, to give us a code of wild animal rights. It has taken eminent botanists like Professor and Mrs. Britton to tell the world what are the rights of our wild flowers. It has taken the most eminent foresters to tell us how to treat the trees; and our greatest ornithologists are the ones who are fighting for the rights of the birds. It stands to reason that to respect the rights of any plant or animal, we must know it when we see it, and know something of its habits. No other force will be so potent in preserving the wild life in our great reservations as Nature-Study, taught thoroughly and sanely in the Public Schools.

Conservation Societies

We publish in this number leaflets of two conservation societies that are doing a great work in the eastern United States in preserving wild plants. We publish these circulars because we wish to spread the knowledge which they give freely to all our readers. This is done with a hope that at least some of our readers may start local conservation clubs or societies that will carry the good work on, for it is a work much needed; and so valuable that the future citizens of our Republic will rise up and call blessed those who have the wisdom and the energy and the love for the out-of-doors that will lead them to start such a movement.

Caught in the Editorial Web

Recently there has come a S.O.S. call from some of our "alivest" readers for information concerning the contributors to the Nature Study Review. We Nature lovers are like a big family anyway, and it is natural enough that we desire to know something more about each other in order that a true family intimacy may be established. It is far more important to us than it could be to the readers of the *Atlantic* or *Ladies Home Journal* to know about contributors to those periodicals, for in their case the information merely satisfies curiosity; while in the case of the readers of our modest magazine closer acquaintance means closer union.

The editor does not claim to know all about all of our contributors, but she knows a lot of things about many of them which she is willing to share with the Review readers as far as the situation requires, so "here goes:"

Dr. Robert Wilson Shufeldt is a New Yorker born, the son of Admiral Wilson of the U. S. Navy. He graduated at Cornell with the class of 1874 and afterwards studied medicine in Columbia. In 1876 he was commissioned First Lieutenant in the Medical Department of the U. S. Army and was made Captain in 1881 and Major in 1904. He acted as Surgeon with Generals Crook, Sheridan and Merritt in Frontier Indian Wars, 1876-81. He was made Curator of the Army and Medical Division in Washington in 1882. He was also appointed Honorary Curator of the Smithsonian Institution by Baird. At the end of the World's War he was placed in charge of the classification of the war collections of the Army Medical Museum. He is a fellow of the A.A.A.'S and a member of nearly all the scientific societies in America and many in Europe. His writings cover a wide range of subjects and he is a valued contributor to many science journals. Luckily for us he has believed with all his heart in the Nature-Study movement and has donated to the REVIEW a large number of most valuable articles illustrated with photographs taken by himself. He is now taking an active part in Nature-Study teaching in Washington.

Miss Adeline M. Wenger teaches Nature-Study in the unique and interesting Riordan School for Boys at Highland, N. Y. She also teaches other subjects and mothers the youngest youngsters as well. She loves the life out-of-doors and has a wide range of Nature interests; she has the generous quality and the rare ability of being able to share her interests with her readers. This is why she writes for the REVIEW.

Clara Thomas was trained in the James Ormond Wilson Normal School at Washington, D. C. and through the inspiration received from Mrs. Alburtis she became interested in and taught Nature-Study in Washington Schools. She is an ambitious young woman and continued her studies evenings in Washington University hoping thus to attain a college degree. Afterwards she studied at Cornell and has since become greatly interested in Landscape Gardening and will probably make this her future work. She has a fine mind and is a thorough student; her articles written for the REVIEW are characterized by careful work as well as by literary grace.

Henry Klein is a young man living in Brooklyn, N. Y., he is a graduate of Cornell. As a writer he is insatiable in seeking information concerning his topics in which he is always deeply interested. Although practical considerations call him to the world of business he still adheres to his ideal of becoming a writer and we hope he will contribute to the REVIEW for years to come.

Amelia J. Calver is a beautiful, serene member of the Shaker Colony at Mount Lebanon, N. Y. She has always loved her Nature surroundings and finds the most perfect companionship in the woods and fields. She has written for the REVIEW in other years and we have rarely met a more sympathetic observer or a more broadminded, interesting woman than is she.

Professor W. P. Alexander is connected with the Buffalo Museum of Natural History as a leader of field trips and an instructor in museum classes. Some years ago he was an assistant to the editor in giving instruction to her classes at Cornell, and he later conducted the classes in the Nature-Study of the Farm at Cornell. He is a man of great cordiality and personal charm, a naturalist, a poet and a musician. He has for many years been a generous contributor to the REVIEW.

Robert Sparks Walker lives in Chattanooga, Tenn. He graduated first from Maryville, Tenn. College and later received a degree of LLB. at the University of Chattanooga. He has been the editor of *The Southern Fruit Grower* since 1900 and is an active member of many horticultural societies. He is a contributor to *Country Life in America*, the *Ladies Home Journal*, the *Youth's Companion* and many other periodicals. We are glad to say that he is also a lecturer in Nature-Study and has directed the making of moving pictures of insects, spiders, plants and birds. He loves the wild flowers and is a very acute observer of their forms and habits and has the happy faculty of putting his observations into verse.

I. R. is a Professor of Biology in a college and declines to sign her or his full name, for fear of being regarded as frivolous, in this delightful discussion of a scientific fact in verse.

Practical Plant Biology. Henry H. Dixon, ScD., F.R.S. 291 pp. Illustrated. Longmans, Green & Co. $1.75.

It is interesting to get a book from the other side of the Atlantic showing us how they are teaching sciences over there. Dr. Dixon is Professor of Botany in the University of Dublin and Director of Trinity College Botanic Garden in Dublin and this book covers a course of elementary lectures on the general morphology and physiology of plants which he gives to his students. The book impresses one with its logical arrangement, scientific accuracy and carefulness of detail. It consists of 30 chapters, each a lecture on some topic beginning with the microscope and how to use it, then follows chapters on the structure of a cell, Saccharomyces Cerevisae Chlamydomonas, Bacteria, and so on up through the plant world to Pinus Silvestris and Scilla Nutans closing with one lecture on heredity and one lecture on evolution. At the end of each lecture is an outline for the practical laboratory work to be done in connection with it. The book is clearly written, straight-forward, technical, scientific and is sure to prove most useful to those who are teaching College Biology. Teachers of Biology in High Schools will find it a valuable reference book.

Elementary Industrial Arts. Leon Loyal Winslow. 335 pp. Illustrated. The MacMillan Company.

The Industrial Arts have to do with Nature's products in one way or another. To the eager, intelligent young naturalist nothing can be more edifying than to learn how man has used Nature's resources in building up civilization; to such this volume will prove a revelation full of interest. Not only does it describe industrial processes, but it also gives practical directions for the construction of different objects in each of the industries discussed. At the end of each chapter is a poem and a list of books relating to the topics. The author is a specialist in drawing and industrial training in the N. Y. State Department of Education. The

illustrations are many and valuable, and they are made by Harry W. Jacobs, Director of Drawing in the Dept. of Education in Buffalo, N. Y. The following are the industrial arts described: Bookmaking, Papermaking. The Manufacture of Baskets and Boxes, Brick and Tile, The Pottery Industry, Cement and Concrete, the Textile Industries, Copper, Iron and Steel, The Soap Industry, The Glass Industry, Wood and Woodworking. The volume is interesting, instructive and useful from every point of view.

From Arrow Head to Airplane. Loren Stiles Minckley M. A. Copyrighted by author and published by Crane & Co., Topeka, Kansas. 226 pp.

Mr. Minckley wrote a volume on "Americanization Through Education" which embodied his ideals of our great country. Now he gets at it from another angle and has written what he terms "An American Epic of Joy and Tragedy." It consists of eleven cantos, the first dealing with Indian customs and those that follow covering the colonial times, the Revolution, the re-construction afterwards, the War of 1812, the growth of the middle west, the Civil War, the forty years following, the War with Spain, twentieth century progress, and finishes with the World War. It is certainly an ambitious work and the historic records are very complete considering the nature of the book, and through it all is carried the ideals of liberty and freedom of a self-governed nation. The plan of rhyming which the author has selected seems to us somewhat difficult and would tax the ingenuity of the best of poets to carry it successfully through a whole volume. A fair example of the verse is the following description of the battle of Bull Run:

"On to Richmond!" North then shouted
So from Washington they scouted;
  Thirty thousand boys in blue
  In July with leaders true
On the twenty-first were routed.

At Bull Run, one-half the distance,
They were met with first resistance,
  And the boys who live today,
  Of those lads in blue and gray
Tell the story with persistence.

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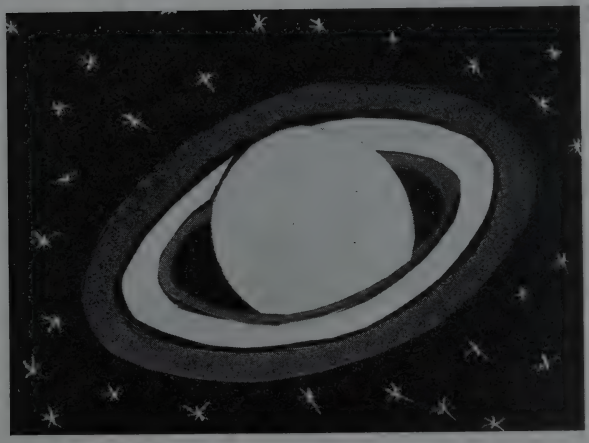

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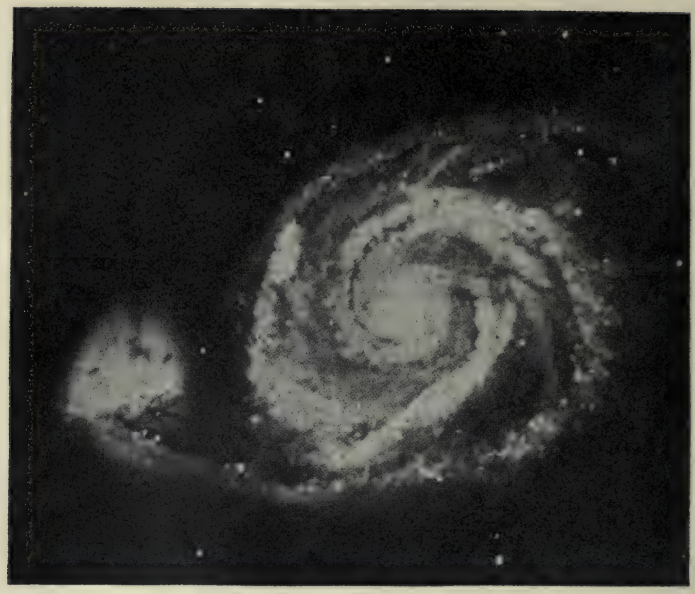

The SUN AND HIS FAMILY may have appeared at the beginning similar to this Spiral Nebula photographed at the Lick Observatory.

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THE
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VOL. 18 NOVEMBER, 1922 NO. 8

Our Own Sun and His Own Family

A. B. COMSTOCK

We all love the sunshine, and we ought to, for it is the source of all life in our beautiful world; but as the sun rises every morning and sets every evening we grow accustomed to the sunshine without giving any thought to the great orb from whence it comes.

The sun is a vast ball of exploding, fuming gases, so hot that its surface may be 15,000 degrees F. which is so much hotter than any furnace heat we have on earth that we cannot even imagine it. This heat from the sun is full of energy; every square yard getting the direct rays from the sun receives energy measured as "three horse power," a horse power being measured as able to raise 33,000 pounds one foot high in one minute.

This great hot ball, so brilliant that we cannot look at it without hurting our eyes rotates on its axis in about 26 days and it rotates in the same direction as does our earth. For all that we know, it may be revolving around some far center as we revolve around it; we do know that it is moving through space toward the constellation Lyra at the rate of nearly 800 miles per minute and is dragging our earth and all the other planets along also at the same speed. Often we see a dark spot on the sun's surface which when examined with a telescope seems to have jagged margins: such spots usually occur in groups and remain about two or three months but sometimes for only a day or so. These spots are supposed to be great electric whirlpools; they do not move about, but each stays in its own place as a hole in the earth would stay in the place where it was made.

The sun is 110 times as thick through as the earth and is so much

heavier that everything on its surface would weigh 27⅔ times as much as on our earth. A man weighing 150 pounds here would weigh two tons there.

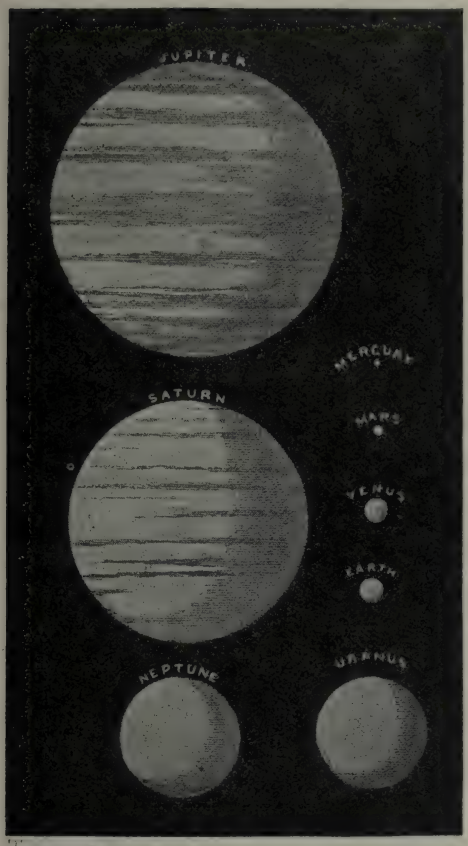
If we could only be near enough to see the wonderful fireworks on the surface of the sun we would witness something grand beyond all description. There are constant explosions of gases, brilliant red in color due to the hydrogen gas which is red hot; these explosions are usually about 50,000 miles high but sometimes they shoot up 300,000 miles, at a rate of from three hundred to five hundred miles per second. Some fireworks, that!

The most interesting thing about the sun, after all, is that with all its heat and light and fireworks it is simply a star, and not a very large one at that. When we look up into the skies on a clear night, every star we see twinkling there is a great sun and may have worlds like our own revolving around it. We could not see these worlds because the stars are so far away that our world could not be seen through the largest telescope on the star that is our nearest neighbor in the skies.

The sun has been worshipped by many people in ancient times. The Egyptians built temples in honor of the sun which faced either the sunrise or sunset. The Grecian temples were placed with reference to the sun as were the great cathedrals built in the Middle Ages. The Vedas of the Hindus were hymns to the sun: and the Incas of Peru built temples to the sun. Although in the olden days men knew but little about the constitution of the sun, yet they realized that they and all of the world around them were in someway dependent upon it, and they showed their gratitude by worship.

Our Own Sun's Family

Some people think that they are the only ones of importance in this world, and some people think that ours is the only world of importance in the Universe, and some of the rest of us think that both are mistaken. In any case, we know that our world is only one of eight which belong to our own sun, the other seven belonging just as securely and regularly as does ours. In many ways these other seven worlds are like ours; they move around the sun, each in its own path, and the paths or orbits are all in nearly the same plane. That is to say, if you were big enough you could step across from the orbit of Mercury to the orbit of Venus, then



Relative size of the Planets

to that of the Earth and next to that of Mars, and then jump over to those of Jupiter and Saturn and Uranus and Neptune just as you would hop from rail to rail across the railroad tracks in a freight-yard; and all of the worlds go around the sun in the same direction exactly opposite to the way that the hands of a clock move, and each one rotates on its own axis just like the earth although their days and nights may be longer or shorter than ours; and all of the worlds shine by reflecting the light of the sun just as does our moon. We also have proven that the same chemical elements exist in all of these worlds though perhaps in different proportion than in ours, although we may lack some possessed by the outermost. The same sun warms them all, the same stars shine down on them all, but each has a different number of moons than ours or none at all.

There are many very interesting differences among the members of our world family, and the very greatest difference between our world and the others, is that we live on it and we do not know who lives on the others.

Mercury is the baby darling of the great sun's family because it is such a little world, only 3,400 miles in diameter, only about a third larger than our moon. Mercury hasn't any moon of its own, but

goes racing around Mother Sun in about 88 days which makes its year very short. It goes around it four times and more while we are going around once. Being so near to the sun there could be no life on this little hustling planet and we have discovered that Mercury always keeps the same face turned towards the sun which means that it rotates on its axis only once in 88 days. We can seldom see Mercury with the naked eye because it is so near the sun and probably has no atmosphere nor water and may be very much like our own dead, rocky moon.

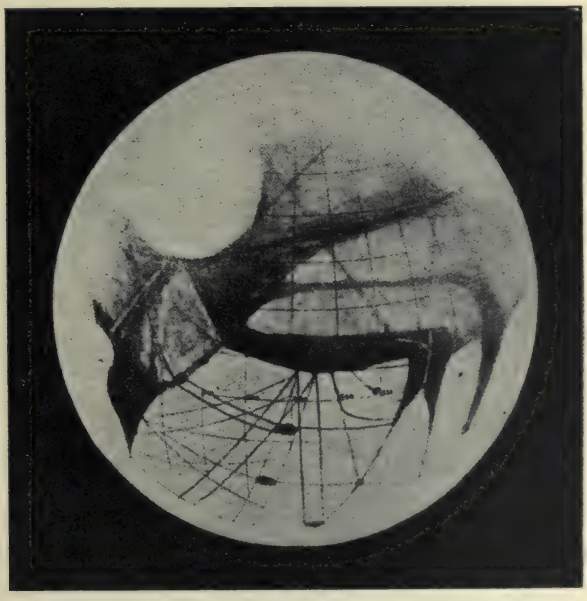
Venus is the world next nearest to the sun and what we do know about Venus fills volumes, and what we do not know about her would fill more. We do know that she is our own most beautiful bright companionable morning or evening star, and has been celebrated for her beauty since man first learned that she was a planet. She is so brilliant at times that on nights when there is no moon the light which she sends down to us casts a shadow, thus the Ancients called her the shepherd's star. Homer called her the beautiful star and Napoleon regarded her as his especial heavenly mascot and once exclaimed "Do you see? That is my star, so long as it shines I will have no doubt of success."

Although Venus is so near to us, the Astronomers hold differing theories about it. Some of the most eminent declare that it keeps one face to the sun all the time as does Mercury, and therefore rotates on it's axis only once in about 225 days which is the length of its year. In this case one side of it must be white-hot and thoroughly baked while the other side must be frozen to stone and therefore could hardly be the abode of life. Other astronomers believe that it has a dense water vapor atmosphere and rotates on its axis in about twenty-four hours in which case it would probably be teeming with life and peopled like the earth. Most astronomers agree that the telescope reveals little of the solid earth of Venus but that it is always hidden in vapor which is one reason why it reflects light of the sun so resplendently. Indeed some astronomers of late have declared that Venus is much more likely to be the abode of life than is Mars. We have faith that sometime this matter will be settled beyond dispute.

During the first of this month Venus is a beautiful evening star and sets about two hours and a half after the sun.

Mars is the one planet we have been able to study most carefully. Its path around the sun lies outside of ours about thirty million

miles, and it is only about half the size of the earth, and its year is about 687 days long; its orbit is more eccentric than is ours. The late Percival Lowell made a careful study of Mars and his book on the subject is most interesting reading. Mars receives less than half as much light and heat from the sun as does the earth; because its orbit is so eccentric it is nearer to us when in opposition some years than others. The last week in August in 1924 it will be as near to us as it ever can be, and we hope that many observations will be taken. Professors McFee and Todd are planning to photograph it from the bottom of a mine shaft in Chili so that the photography can go on during the daytime; they will use a very large telescope. Some astronomers do not have much faith in this undertaking, but let us hope that they will succeed. Mars has a day about 24½ hours long and its axis is inclined to its orbit plane similar to that of the earth; its seasons corresponding to our own,



Mars, Showing the Double Canals. After a drawing made at the Lowell Observatory.

but are twice as long since it has so far to travel because of the length of its yearly path; its force of gravity is about four-tenths that of the earth. It has an atmosphere and during the change of

its seasons white-caps appear about its poles in Winter and disappear in the Summer, and are therefore generally supposed to consist of ice. Lowell mapped many lines on Mars which are called canals; these canals have been seen by others to a lesser extent, but all astronomers do not agree with Lowell that the canals were the result of the labors of creatures of intelligence. There is a dark area extending across the face of Mars called the Hour-glass Sea, for it was once supposed that this dark area was water. Now we know that it is rock or land of a different color, and is probably a desert. Mars has two little moons named after the mythical steeds which drew the chariot of the War-god, Mars. They are the tiniest little moons that we know about, Phebos being only 36 miles in diameter and Deimos only 10. Deimos moves around Mars in about 30 hours while Phebos "does his whirl" in about 7½ hours which makes the shortest month that we know anything about.

Mars may be seen during this month in the southwest in Capricornus, it can be easily found as a red glowing star south of Altair.

To the beginner of star study the morning and evening stars are a puzzle; and indeed, unless one has a knowledge of the higher mathematics, the movements of our sister planets seem most mysterious. Why and how do they change from morning to evening stars and from evening to morning stars? There are just a few facts that we may remember, and perhaps if we have a diagram, we may understand them. Take for instance the movement of Venus when it is on the west side of the sun, it naturally rises earlier than the sun, and therefore we see it as a morning star. When it is on the east side of the sun we can easily understand that it sets later than the sun and is therefore an evening star. When it is behind or directly between us and the sun, we cannot see it at all, and it is therefore passing from an evening to a morning star, or from a morning to an evening star and is lost in the light.

There are a few terms, which, if mastered, will make the astronomical news given us in periodicals much more intelligible. When one of the planets whose orbit lies between ours and the sun is on the same side of the sun as we and nearly in line with us and the sun it is said to be in "inferior conjunction," when it is on the far side of the sun from us and nearly in line with it and us, it is said to be in "superior conjunction." But if a planet whose orbit is outside of ours is on the far side of the sun nearly in line with us it is merely said to be in "conjunction" and is of course farthest

away from us that it ever can be; but when it is on the same side of the sun as we and nearly in line with it and us, it is said to be in "opposition." The planets whose orbits are nearer the sun than ours are called inferior while those whose orbits are outside of ours are called superior.

The planetoids are some very little worlds, a company of them that seem to occupy a space between the inner and outer planets, the largest one of these is Ceres and is 177 miles through; but the most interesting one because it is nearest to us and we are able to observe it more closely is Eros and it moves around the sun in 643 days. Many of these tiny worlds have never been named, their

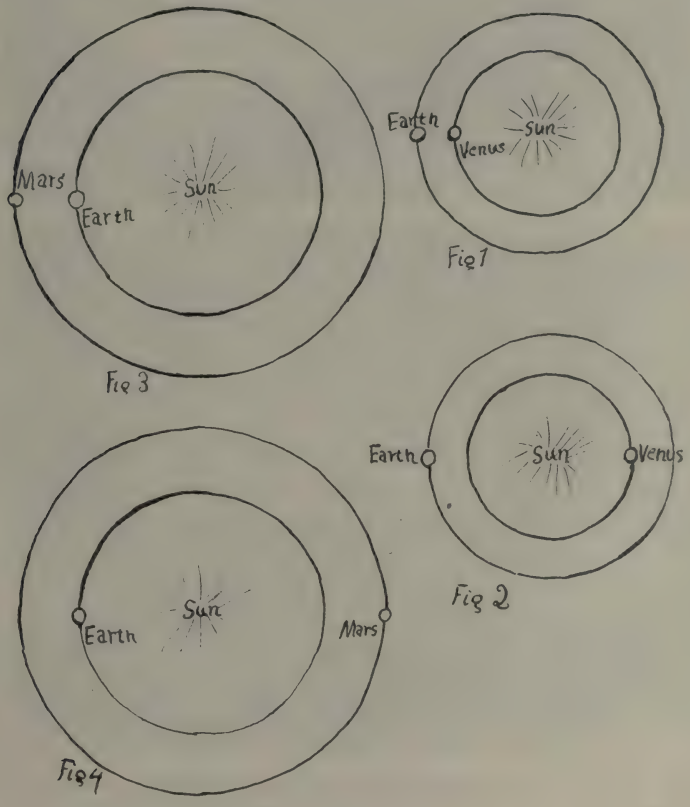
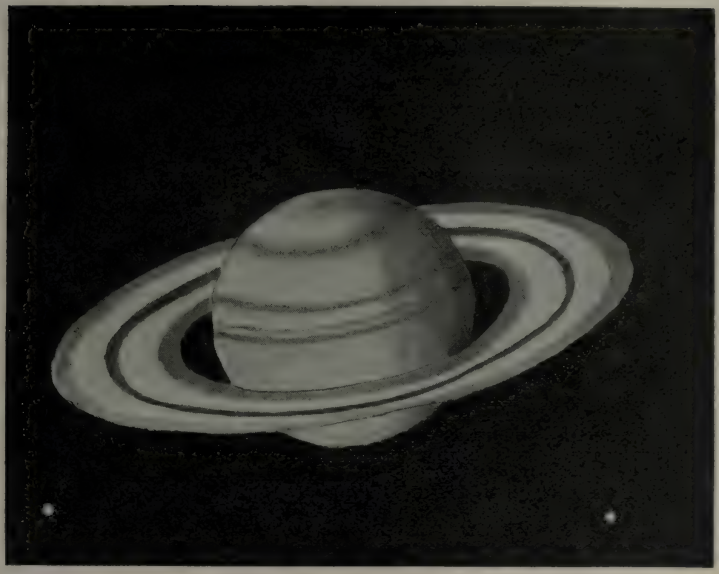


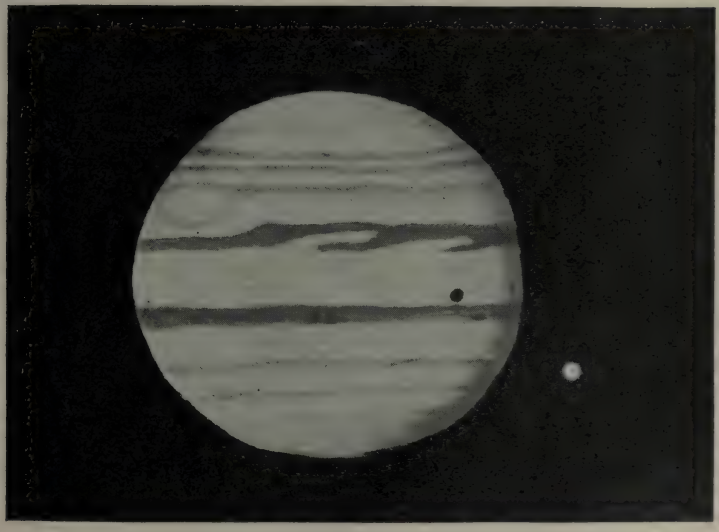
Fig. 1. Venus in inferior conjunction.
Fig. 2. Venus in superior conjunction.
Fig. 3. Mars in opposition.
Fig. 4. Mars in conjunction.

orbits are more eccentric than those of the large planets and consequently they cross and re-cross each others paths without any conflict; seven of them cross the path of Mars and two cross the path of Jupiter.

The next planet beyond the midget worlds is great Jupiter 1,300 times as large as the earth. His diameter at the Equator is more than 90,000 miles and it takes him 11 years, 10½ months to go once around the sun. He rotates on his own axis in a little less than ten hours, but as this great planet is a gaseous body not all of the parts rotate at the same speed, the Equator rotating more rapidly than the poles. His days are so short and his year so long that there are more than 10,000 days in one year. Jupiter has a thick atmosphere, probably one thousand miles in depth, and is probably a very hot planet, but not hot enough to shine except by reflecting the light of the sun, and is altogether too young to be the abode of life. When seen through a telescope Jupiter is a yellow globe with a series of broad, dull brownish and lighter bands alternating parallel with the Equator; on each side of the Equator are two reddish brown or slatey belts, all of these belts or bands change somewhat in color and form for they consist of vapor. The great father of astronomy, Gallileo, discovered in 1610 through his precious, but to us very crude, telescope that Jupiter had four moons. These vary in size from a diameter of 2,000 to 3,550 miles and are large enough to be called worlds. Our moon measures only 2,160 miles through. One of Jupiter's moons races around that planet in 42 hours. Later astronomers with better telescopes have discovered that Jupiter really has nine moons, the nearest one to the great planet being only 100 miles in diameter and has the speed record of moons, for it races around Jupiter in a little less than 12 hours. Because of his many moons, Jupiter has transits, occulations and eclipses so numerous that he is a great favorite with young observers who are enjoying the wonders of the telescope.

Something more than four million miles beyond great Jupiter is another large planet which is perhaps the most interesting of them all; this is Saturn and was the outermost world known to the ancients. It is dull reddish-yellow in color and is about 740 times larger than the earth, but is gaseous and therefore not so heavy comparatively. It is so far from the sun that it makes its circle only once in about 29½ years. It is more than 73,000 miles through and rotates on its axis in 10 hours and 14 minutes. It is so far





Saturn—with it's rings and two of it's moons.
Jupiter—with one of it's moons. Note the shadow of a moon, the black spot at the right.
After a photograph taken at the Lick Observatory.

from the sun that it gets very little heat from it and would be frozen solid if it had no heat of its own, but it is undoubtedly very hot in itself, although not sufficiently so to give off light. The rings of Saturn which make it such a beautiful object to look at through a telescope are supposed to be composed of meteoric particles each revolving "on its own hook" and all revolving around Saturn in the same direction in which Saturn rotates on its axis. There are several of these rings, one outside the other. There is an outer bright ring which is more than 11,000 miles wide, then a dark ring more than 2,000 miles wide, then another bright ring 18,000 miles wide, but which on its inner edge fades into a dusky color and is called the crepe ring. This inner ring is about 10,000 miles from Saturn. These rings are about 100 miles in thickness when seen on edge, half of Saturn is seen above and half below; but when tipped so that we see Saturn in its setting of rings, it is surely a magnificent sight. The outer rings do not rotate so rapidly as do the inner ones.

Saturn has beside its beautiful rings, more than its share of moons, 10 of them, all of which revolve around it outside of the rings. The largest has a diameter of 3,720 miles, but Saturn surely cannot reckon time by months for one of his moons circles around him in 15 days and another in 79 days, while his farthest away little moon only 150 miles through and named Phoebe circles around him in the opposite direction from the other moons and the rings, and her month is 546 days long. Phoebe is a very independent little flapper of a moon and follows her own ways without regard to the laws of her elders, which led C. S. Day, Jr., to write the following ode to Phoebe:

Phoebe, Phoebe, whirling high
In our neatly plotted sky
Listen, Phoebe to my lay
Wont you whirl the other way?

All the other stars are good
And revolve the way they should
Only you of that bright throng
Will persist in going wrong.

Don't reply what God has said,
We have made a law instead;
Have you never heard of this
Nebular hypothesis?

It prescribes in terms exact
Just how every star should act;
Tells each little satellite
Where to go to whirl at night.

Disobedience incurs
Anger of astronomers,
Who, you must not think it odd,
Are more finicky than God.

So, my dear, you better change,
Really we can't rearrange
All our charts from Mars to Hebe,
Just to suit a chit, like Phoebe.

Far beyond Saturn is a very far away world, Uranus which is a huge globe having a diameter of 31,900 miles. It is so far away from the sun that it circles around it once in about 84 years. A strange thing about this far-away world is that it rotates backward on its axis, that is, from east to west, but it revolves around the sun in the regular approved way of the planet family. It is probably in a gaseous state and very hot. It has four moons none of which is more than 1,000 miles thick and they are a lawless lot from a respectable moon standpoint, for they move around Uranus crosswise and at right angles to his orbit, and move backwards at that, but what hustling months they make! There is nothing slow about the moons of Uranus even if they are small and do revolve backward and at right-angles to the paths they should follow. The moon with the longest record makes its circle in less than nine days, and the liveliest one of the four whirls about it in two and one-half days. As we read with wonder about these moons of Uranus, we wonder if perchance Saturn's Phoebe may not have gotten her erratic ways by associating with them. Probably the astronomers would smile at this flight of imagination.

Neptune is the outermost planet of our sun's family, and is so far away that it came near never being discovered by a telescope. It had never been identified as a planet until after the mathematicians became suspicious after they discovered certain irregularities in Uranus' journey around the sun. It so happened that two very clever mathematicians worked out independently a theory to account for this irregularity which involved a planet circling far beyond which might thus effect the actions of Uranus, and soon after this in 1840 Neptune was discovered through a telescope in just about the position that the mathematicians had predicted. It is so far away that it is only as bright as a star of the ninth magnitude. It is also a gaseous planet and has a diameter of 35,000 miles, and it is probably very hot. It is so far away from our sun, that its year is nearly 165 of our years long. If they elect Presidents for four years on Neptune, the term would be 660 years. Neptune is supposed to rotate on its axis backwards from east to west. It has one moon which moves around it backwards as compared to the direction in which most moons move around their primaries.

When we think of the millions of miles covered by our sun and its family of worlds, we have a feeling that they must occupy a very large protion of the universe, but they really occupy only a

very small space when we think of them in terms of the stars, all of which are other suns. Dr. Simon Newcomb has given us in his astronomy for everybody, the very best comparison ever made to show us how small we are. He says that if along the Atlantic coast we should make a model of our solar system, we might put an apple down in a field to represent the sun, then our earth would be represented by a mustard seed 40 feet away revolving around the apple, and Neptune could be represented as a small pea circling around the apple at a distance of one-fourth mile, thus our whole solar system could be shown in a field one-half mile square if we did not include the comets; but to find the nearest star which is a sun only four and one-half light years away from us, we should have to travel from this field on the Atlantic Coast across the whole of North America to California, and then go on a ship out into the Pacific Ocean before we could reach our nearest star neighbor which would be another sun like our own and represented by another apple.

The Moon Came Down to Earth

E. B. WHITING
Branford, Conn.

Where is there a man who has not cried for the moon at some point in his career? More favored than so many of my fellow mortals, during an afternoon stroll in the woods, I came upon the fallen moon, spots and all. I brought it home and took its picture side by side with our full sized cat and again upon the lawn between two children. The moon measured twenty-eight inches around its shortest circumference and thirty-one inches around its longest.

Then we ate it. Green cheese? No, sir! Better than that. Cut in sweet smelling steaks an inch and a half thick, it made the backbone of several meals and had the best canned mushrooms beaten to a distinct frazzle.

The Moon and Thoreau

GLADYS A. HARPER
Yardly, Penn.

"The full-orbed moon with unchanged ray
Mounts up the eastern sky
Not doomed to those short nights for aye,
But shining steadily."

"She does not wane, but my fortune,
Which her rays do not bless;
My wayward path declineth soon,
But she shines not the less."

"And if she faintly glimmers here,
And palid is her light,
Yet alway in her proper sphere
She's mistress of the night."
—*Thoreau.*

The above is one of the lovely ways in which Thoreau expresses the majesty of the moon. Thoreau makes one feel the beauty and grandeur of things around one. In this particular case he is making his reader feel that they simply must study the moon and the moonlight—again and again to see all that they have not before observed.

The moon is a little dead world which circles around the world with one face always turned toward us. There are light and dark areas on the moon. One-half of the moon is always in shadow as is also the earth because the sun can shine on only one side of a sphere at a given time. Our earth is four times as wide as the moon. It takes the moon twenty-nine and one-half days to go around the earth. The length of the moon day is 14¾ days long and the night 14¾ days long. The path of the moon in summer is nearly the same as the sun's.

The moon generally rises fifty minutes later each night. However the time varies. In August it rises scmetimes not less than thirty minutes later each night. The full moon rises at sunset and sets at sunrise.

The moon shines by reflected light. Moonlight is a cold dewy light in which vapors of the day are condensed and though the air is obscured by darkness it is more clear. Moonlight as defined in Reed's Cyclopedia is "The light of the moon, condensed by the best mirrors, with an intensity that produces no sensible heat upon the thermometer. The light of the moon is very inferior in quantity

and intensity to that of the sun." Dr. Hooke calculated it would require 104,368 full moons to give light and heat equal to that of the sun at noon. Dr. Smith says, "The light of the full moon is but equal to a 90,900th part of the common light of the day, when the sun is hidden by a cloud."

Thoreau by studying the moonlight at different times reveals to us the beauty and grandeur of its power. Thoreau says, "Moonlight is the best restorer of antiquity. By moonlight we are not of the earth earthly, but of the earth spiritual." "At moonlight all is simple. We are enabled to erect ourselves, our minds, on account of the fewness of objects."

"The moonlight is a light of course, which we have had all day but which we have not appreciated and proves how remarkable a lesser light can be when a greater has departed."

The moonlight reveals the beauty of the trees. It is necessary to see objects by moonlight as well as by sunlight to get a complete idea of them.

The moonlight greatly affects things. Thoreau says, "Moonlight is like a cup of cold water to a thirsty man. Moonlight is more favorable to meditation than sunlight."

The moonlight is a great friend to the weary traveller. The incessant motion of the moon traversing the clouds provides entertainment for him. The light of the moon reflected from the streams adds a charm, a dignity and a glory to the earth. The landscape seen from the slightest elevation by moonlight is seen remotely and flattened as it were into mere light and shade, open field and forest, like the surface of the earth seen from the top of a mountain.

Our earth is a moon to the moon and makes us see the moon as a dark circle within the new moon crescent. The reason the moon appears to us as a thin crescent is because we see only the edge of one side of the moon illuminated.

The moon during the week in which she is full in harvest rises sooner after sunset than she does any other full moon week in the year. By doing so she affords an immediate supply of light after sunset. This full moon is known as the Harvest Moon. The moon looks colder in the water. The openness of the leafless woods is particularly apparent by moonlight. They are nearly as bright as the open field. The moonlight reflected from fine frost crystals on withered grass gives the appearance of glow-worms. In the summer evenings one can hear the singing birds and see the fireflies. In the

autumn one hears the katydids, and crickets. The shadows of the trees and shrubs are more conspicuous than the objects themselves, the slight irregularities in the ground are revealed by shadows, while landscapes are more variegated and picturesque. All white objects appear more remarkable than in the day. The foliage of woods is heavy and dark. The moonlight reflected from particular stumps in the recess of the forest as if she selected what to shine on. The senses of hearing and smelling become more alert.

When the moon is three-quarters full the nights are very still. The moon gives a white cold light thru which one can see far distinctly. To appreciate the moonlight one must stand in the shade.

Even by night the sky is blue and not black, for one can see through the shadow of the earth into the distant atmosphere of day where the sunbeams are revealing.

Thoreau says, "How insupportable would be the days if the night with its dews and darkness did not come to restore the drooping world."

Thoreau's description of a full moon rising on a summer night is beautiful. It is as follows, "The full moon rising at nine o'clock is revealed first by some slight clouds above the eastern horizon looking white, first indicating that she is about to rise. In the west similar clouds seen against a lighter sky look dark and heavy. Now a lower cloud in the east reflects a more yellowish light. The moon far over the round globe travelling this way, sends her light forward to yonder cloud, from which news of her coming is reflected. The moon's aurora! it is without redness like the dawn of philosophy. Only belated travellers to greet her. More and more yellow glows the low cloud with concentrating light, and now the moon's edge suddenly appears above a low bank of cloud not seen before and she comes forward apace without introduction after all; and the steadiness when she rises with undisturbed serenity—like a queen who has learned to walk before her court, is glorious and she soon reaches the open sea of the heavens. She seems to advance by graceful sallying essays trailing her garment up the sky."

"Time wears her not; she doth his chariot guide;
Mortality below her orb is placed."

—*Raleigh*

Venus

Dorothy Purdy Hillas
Morristown, N. J.

This planet, appearing in a burst of brilliancy, soon retreating and again peeping out before the world is yet awake is aptly named for the goddess who in mythology is typical of love and beauty. It is the best known and most admired of the planets excelling the others when it hangs in silvery softness above the sun which has just disappeared from view. It is equally lovely when it appears as a morning star just before the sun rises.

Venus is the most easily recognized planet due to its extreme brilliancy and a peculiar silvery appearance just a little tinged with yellow. Likewise it is easily remembered by its favorable situation and limited range. It is far enough away from the sun to be seen as much as three hours after sunset, yet because it has a smaller orbit which is nearer the sun than that of the earth, it does not rise to heights, which are uncomfortable for observance. When seen at all, it appears in brilliancy which brings joy to the beholder.

Venus never twinkles but her light is so steady and soft that at times the disk can almost be seen with the naked eyes, and the light can often be seen in the daytime if one knows where to look. It is six times as bright as that brightest of all fixed stars Sirius. Besides being intrinsically brighter than any of the other planets, this brilliancy appears even greater since Venus comes nearer to the earth than any other. From equal areas, it reflects four times as much light as Mercury and three times as much as Mars.

The planet is never higher in the sky than 45 degrees which is half way between the horizon and zenith, and never farther from the sun than 48 degrees. She is 67,269,000 miles from the sun and 25,000,000 miles from the earth when in inferior conjunction, nearer the earth than any other planet except the moon and one small asteroid. This is also the nearest which Venus approaches any other heavenly body.

About six weeks after Venus has passed superior conjunction, we first begin to notice her. She is then very near the sun, and follows him a little less than half an hour after sunset. Every evening following she shines brighter, mounts higher, and sets later, until seven months later, she sets a little more than three hours after

sundown. Now she reaches her greatest elongation east of the sun and shines a beautiful and conspicuous object, steadily growing brighter because she is coming towards us. She now starts to travel back toward the sun. In four to five weeks she attains her greatest brilliancy as an evening star. About 12 days later she reaches a point where she appears to remain stationery, at the place where she is about to overtake us in our journey around the sun. Soon she moves gradually on in a westward course among the stars. Now she draws nearer the sun, sets earlier and we see her with increasing difficulty. At the end of three weeks she is on a line between us and the sun, and is invisible. This is her inferior conjunction.

About two weeks later we notice about an hour before sunrise, that Venus appears as a splendid morning star. For the next three weeks she attains her greatest brilliancy as a morning star. She continues to glow brilliantly for some weeks and then in about five more she will have reached her greatest elongation west of the sun, rising three and one-half hours before dawn.

Now Venus begins to retrace her path—she moves eastward, but more slowly, and appears smaller gradually until after more than seven months she reaches the sun and again is in superior conjunction. From one superior conjunction to the next it is a period of 584 days, varying at times, but every eight years, Venus and the earth come to the same relation.

Venus shows us her full face at superior conjunction, when she is the farthest away and the smallest. When at eastern elongation, she appears as a half moon, becoming a thinner crescent as she approaches inferior conjunction, then she repeats these phases in reverse order as she approaches superior conjunction.

We have evidence of an atmosphere on Venus by reason of the ring about her as she travels across the face of the sun, and also we gather that clouds must be present because of the high reflecting power. We cannot judge much of the surface of Venus, even tho we are so near. Her unillumined side is turned toward us when she is nearest. She is much like the earth—there is a difference of less than 300 miles in diameter, and the surface, mass and volume are much alike. Perhaps the length of the day is equally similar but we do not know.

To the Ancients, Venus was the brightest of all heavenly bodies next to the sun and the moon. As an evening star they called her Hesperus or Vesper, and as a morning star Phosphorous or Lucifer.

"Sad Hesper, o'er the buried sun,
And ready thou, to die with him;
Thou watchest all things ever dim
And dimmer, and a glowy dome.

Bright Phosphor, fresher for the night,
By thee the world's great work is heard
Beginning, and the wakeful bird;
Behind thee comes the greater light.

Sweet Hesper—Phosphor, double name
For what is one, the first, the last,
Thou like my present and my past,
Thy place is changed, thou art the same.

—*Tennyson—In Memoriam.*

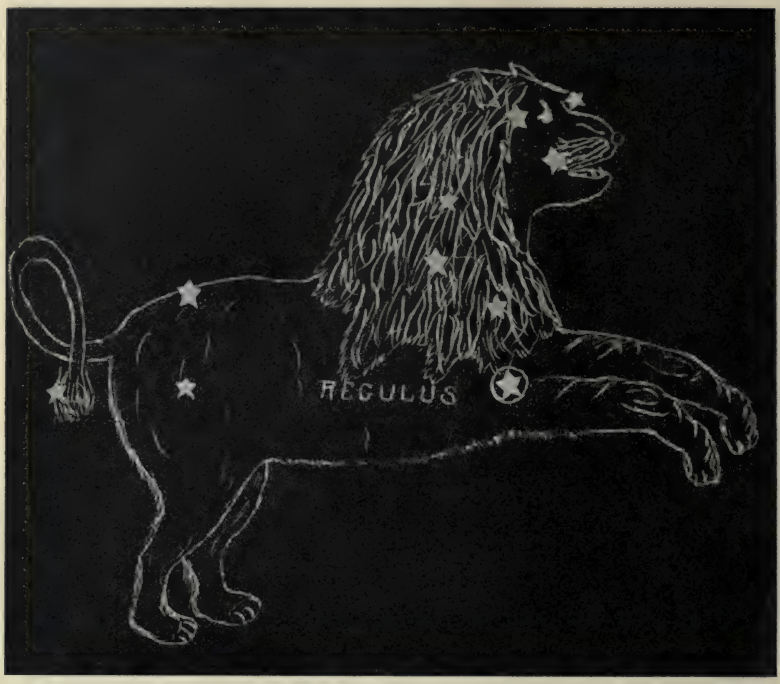
Procyon—The little dog Star. Orion
Sirius—The big dog Star.

Taurus—The Bull
Note that the Hyades form the head and "Red Aldebaran" the eye.

Star Charts Made By Paper Cutting

These scissored charts of the constellations of Orion, Taurus and Leo, and that of Saturn on the cover of this month's REVIEW were made by pupils of Grade 8A in Public School No. 167, Brooklyn, N. Y. They were done under the direct guidance of Miss Eva Marian Provost and the work was not a part of the regular curriculum but was done as Miss Provost says "as an expression of interest and joy in the subject—by an astronomy art club of the class."

Miss Provost has had a broad and thorough training in nature-study and is as much at home with the trees, flowers and birds as she is with the stars. Although she has never officially taught Nature-Study, she is a shining example of a teacher who enriches whatever subject she is called upon to teach by her knowledge of natural history and her close and enlightened sympathy for all that lives in field and wood.



The constellation of Leo—The Lion
Note that the Sickle forms the lion's head and the great star Regulus tips the handle of the Sickle.

The charts consist of stars and name of constellation cut from white paper and placed on blue paper 11 x 8½ inches and this in turn mounted on white heavy paper so as to give a half inch margin. The outlines of the constellations are made with Chinese white. The effect is very attractive and edifying. We have shown the charts that Miss Provost was kind enough to send us to a large number of teachers and their beauty and excellent technique have won general admiration. The charts show many more constellations than we have reproduced here and also show eclipses, comets and relative size of the planets. To teachers undertaking this work we strongly recommend "The Stars in Song and Legend" by Doctor Jermain G. Porter, published by Ginn & Co.; it contains the beautiful drawings of the mythical figures of the constellations by Albrecht Dürer.

In the Land of Stars and Star Fairy Dreamland*

Little Ted and his mother were out looking at the sky. It was night time, but it was not dark outside for the sky seemed carpeted with stars; big stars and little stars, bright stars and dim stars, some that twinkled and some that gave a steady light.

The colors also were different, some shone with the red light, some with blue, some with yellow.

They were so bright and beautiful they looked like millions of electric lights in the sky.

Brighter than the stars and much larger than the stars shone our relation, the moon. We like the moon the best because she is nearer to us than the other stars and planets, and that is why she looks so very, very big.

"Mother, is the moon the sun, is it called the moon at night and the sun in the day time?"

"Oh no! my child, the sun and moon are very different, the sun is like a great father giving light to his children and grand- children.

"The eight planets, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune, these the Solar system, are the sun's children, and travel around the sun.

"The moons which travel around the planets are the sun's grand-children.

"We live on the planet called the Earth and our moon travels around us so she is the Earth's child and we all love to watch her for she really belongs to us.

"The Sun gives the light to the moon and the planets. Why if it were not for the sun, we would have no light.

"Look, Ted, at all the star patterns in the sky and they all have names just as you and I have names, and people know their names and wise men have studied about them and have found a way to measure how far away they are and how large they are.

"Do you know that some of those little bits of stars are much—oh, very much, larger than our sun, but they look so little because they are so very, very far away. Why, our sun is 93,000,000 miles away and it would cost over $2,000,000 to take a train ride to the sun."

"Oh mother, I wish I could visit the sun and the moon and see what they are like."

*The name of the author of this story has been lost.

"Well, my little boy must be content to visit the sun and moon in storyland."

"Mother tell me a story every night about the skyland, will you?"

"Yes, but now you had better go off to dreamland," and before very long that was just what Ted did. He went to really dreamland, and suddenly he heard a little curious voice say;—

"Star bright—star light,
Moonbeams—star dreams."

And there before him was the most beautiful little star fairy with silvery wings and all about shone a glimmering vaporing mist.

"Why, who are you, said Ted?"

"I am the fairy of star dreams and I have come to take you to visit the moon."

"Oh! Oh! that is the very place I want to visit and I should like to visit the sun too."

"I shan't take you to visit the sun to-night, but I know you would enjoy the fireworks there for the sun has tremendous explosions which shoot out flames about 300,000 miles high and they shoot two hundred times faster than a rifle bullet travels."

Ted clapped his hands when he heard about the wonderful fireworks on the sun.

"Oh, wouldn't that be fine," said Ted.

"Let us be off to the moon to-night, but first I must change you into a fairy, for people like you could never live on the moon because you must breathe air to live and the moon has no air."

Whish! Twish!—

On the wings of the night,
By the moonbeams made bright.
Up, up, through earth's air
To the atmosphere rare.
On, on, on, in their flight,
The moon reached, what a sight!

It was a grand sight to see those wonderful mountains and valleys. The mountains are higher than the highest mountains on earth.

There were deep—deep holes and in the midst of the holes great mountain peaks arose.

"Why fairy, I do not see any water."

"Oh, there is no air here on the moon, so of course there is no water."

"But where are the trees and flowers and grass?"

"Oh, there cannot be any trees nor flowers, nor grass nor animals, nor people where there is no air and no water."

"But why are there no pretty colors here on the moon?"

"Oh, we need air and clouds to sift out the rays of light and to reflect them.

"Look at that high mountain over there, it looks about a mile away but it is really one hundred miles away for things one hundred miles away seem but one mile away on the moon."

"Oh, star fairy, feel this large rock how light it is."

"Oh, don't you know that things on the Earth are six times as heavy as they are on the moon."

"How dark it is in the shadow of the mountain!"

"Oh yes, even in daylight the shadows of the mountains are as black as ink."

"In the day time it is 500° above zero while in the night it is 250° below zero. The daytime is five times as hot as it is on a very hot day where you live on the earth, and it is about twelve times as cold as the coldest day where you live on the earth."*

"Star fairy I believe I like our own Earth the best, suppose we go back to our home where we have air and water and life and color and sound."

Something bright was shining into Ted's eyes and seemed to say "wake up little boy," and Ted did wake up and rubbed and rubbed his eyes.

"Oh! Mother! Mother! I had a wonderful dream and the Star fairy took me a visit to the moon but I like it here the best, where we have air to breathe, water to drink, good things that live and grow to eat, wonderful sounds to hear, and beautiful colors to see.

"Oh! I am glad I live on the earth."

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*If Ted and the fairy had not been talking fairy talk they could not have heard each other speak for there is no sound on the moon, for the air waves make the sound. It is just still and quiet, not a sound.

Time and Change

LEON AUGUSTUS HAUSMAN

See the everlasting hills
Yield their substance to the rills—
Rills that tear them, rills that bear them
On through rivers to the sea,
To the sounding bounding sea,
To the earth-surrounding sea;
Hurrying from their lofty heights
Through the vales and o'er the lea.
'Til within the mighty ocean
Cease the rivers in their motion,
And the sands of their erosion
Sink to rest.

Deep beneath the waves they lie
In the darkness of the waters,
In the green and silent waters,
And the fishes pass them by,
Winnowing with fins of silver
O'er the ocean's level breast.

Where are the eternal hills,
Birthplace of a thousand rills,
Birthplace of the mighty rivers
Wand'ring languid o'er the plain?
They are dragged from off their station,
Levelled from their proud foundation,
By their streamlets' degradation
Hurried off into the main!

In unfathomed depths they sleep,
Far in ocean's bosom deep,
'Til they shall be indurated,
Be upraised and reinstated,
Folded, faulted, and plicated
Into rolling hills again!

Common Mistakes in Natural History*

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Man has roamed over the surface of this earth for at least a half million years. His progress has been incredibly slow. Most of his superstitions are the superstitions of the cave man. Many of his errors have a direct lineage to folk-lore and nursery rhyme. Is it not remarkable how little we change? A man-made war in Europe may kill thousands and man-made traditions live. A great step in mental conservation would be taken by eliminating our load of errors and mysticism.

The following notes are based on a recent examination which was given to test the kind and extent of mistakes pertaining to natural history. The total number examined was 281. This included 14 different classes ranging from the Junior High School through the College. The results indicate how little the average student thinks and how little the most of them see. Without doubt thousands more will roam the same road until our schools authorities open the avenues of opportunity to think and discover.

If there were any way of knowing many people would be glad to learn, sub rosa or otherwise, whether they should be classified as traditionalists or progressives. This article has been written so that the reader may test himself as to his belief in Natural History ideas which are ill-born, and of a crude age. The questions introduce a usual misconception and immediately following is told the origin of the erroneous idea and the correction. The percentages are given so that the reader will know where he ranges with others in respect to the right answer. Once realizing the value of live interests it is hoped the reader will help smother the system which glorifies mute memorials of a chaotic past.

Old Sayings Versus Economic Facts

Has your training been one of tradition or of realities? Try the following test and then read about the results of the test in various schools and the interpretation.

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These are common "sayings." Fill in the missing words.	Name one economic fact about each animal mentioned.
a. .....as a bee;	Bees.....
b. .....as an owl;	Owls.....
c. .....as a bat;	Bats.....
d. .....as a loon;	Loons.....
e. .....as an adder;	Adders.....
f. .....as a peacock;	Peacocks.....
g. .....as a mouse;	Mice.....
h. .....as a crow;	Crows.....
i. .....like a hawk;	Hawks.....
j. .....as a hornet;	Hornets.....

Many of our "old sayings" are anything but true. "Busy as a Bee" is the most familiar. 90%-100% of the pupils in the various schools examined remember the old adage. Yet a bumble bee is the antithesis of thrift and does not store enough honey to keep the colony over winter. Only the queens survive the rigors of winter. If by the "busy bee" is meant the honey bee we have but to recall that the community is noted for its drones. The queen and drones do none of the work of the hive, have no pollen baskets, cannot sting, and cannot secrete wax. All the members of the hive loaf or hibernate during the winter. It would be far more appropriate to say as "Idle as a Bee."

A naturalist does not need to be reminded that bats are not blind; owls are not wise; loons are not crazy; adders are not deaf; peacocks are not proud; crows are not black; and hornets are not mad. The results show, however that people are more apt to remember an old saying which is an untruth (prosaic ignorance) than even one economic fact about an animal. Is this because of or in spite of our education systems? The results of this test are as follows:

Kind of School Examined	*Number Examined*	*% of Sayings remembered in Proportion to 1 Economic fact.*
State Agricultural College—Seniors	14	.95
Normal School Graduates (Taught one term)	14	1.3
Normal School Seniors	9	2.9
College Freshmen (Males)	50	1.02
College Freshmen (Females)	50	2.7

Normal School Freshmen (No Biological Training)	31	3.3
Normal School Freshmen (Botany in High School)	11	5.2
High School Seniors (Course in Biology)	14	1.26
High School Seniors (No course in Biology)	7	
High School Freshmen	25	1.93
Junior High School No. 1 (Ninth Grade Males)	14	1.26
Junior High School No. 1 (Ninth Grade, Females)	14	.84
Junior High School No. 2 (Ninth Grade, Males)	14	.71
Junior High School No. 2 (Ninth Grade, Females)	14	.85
Total Number Examined	281	

The average number of sayings remembered in proportion to one economic fact:

Bees	1.06	Peacock	1.4
Owl	1.8	Mouse	1.33
Bat	2.6	Crow	1.24
Loon	8.0	Hawk	.47
Adder	.57	Hornet	1.9

It is rather astonishing to find that the Adder and the Hawk are the only two animals in the list that are more apt to be remembered in connection with some economic fact than in an old saying. It is also surprising to find that with the exception of the seniors in an Agricultural College the pupils of Junior High School are the only ones to know more about the economics of these common animals than about their myths.

In the case of the Bat five girls out of fourteen in a Junior High School mentioned the possibility of Bats getting into ones hair. Only one boy out of fourteen mentioned that this might happen. This belief is a feminine trait,—perhaps because they are more concerned. Tradition is long-lived. The tax that progress has to pay superstition is the worst kind of taxation because along with it vanishes the powers of reasoning.

Old sayings are passed down for the most part by "word of mouth." They receive a great deal of encouragement in first grade readers and early-grade literature. These sayings pertain to our commonest animals. At the same time our current literature and government publications furnish a host of facts about these same animals. Then there is the opportunity of gaining information by observation. Hearsay, reading, and observation are the three vehicles of information and if judged by present day results the effectiveness diminishes in the order named, hearsay

being far more potent in our present working conception than observation. One is passive absorption, the other active production. One is parasitism, the other kinetic energy. One is nursery rhyme mysticism, the other is work bench service. One is charity entertainment, the other has everyone in the play. One is predigested food, the other food for digestion. One is senile sport, the other youthful enjoyment. The function of the school is to make production more interesting than elegant consumption.

Ten ideas like "Blind as a Bat" remain ten ideas. There is nothing to provoke new thought. The discovery of one idea about the Bat, as—it eats insects—demands more ideas. One can be intellectually as well as physically blind. The first method is one of conspicuous wastefulness whereas the second tends toward further service. Shall we spend our wealth of education in self-indulgence or in production for the community? If educational courses mean self-indulgence they stop there. If they mean "I have come to make life more abundant" the curriculum needs revision.

Some of the economic facts for which credit was given were due to reputation rather than fact. The ratios have thereby been greatly softened and should we double the sayings as they now stand in proportion to the economic facts the results would be nearer scientific. Take crows for example: fifty per cent of the economic facts given were that crows eat corn. Only twenty-two per cent mention anything of credit to the crow yet authorities say that the crows' credit account with the farmer far outweighs the debit side. A small minority—yet a serious number—mention such things as "pick out your eyes." One is reminded of the Old Danish Proverb—"A Crow is never the whiter for often washing," or the Chinese saying that "Crows are black all the world over." The axiom of today as regards pupils reared by the tribal-folk-lore method might be "They are never the wiser for often observing."

The Hawk record parallels that of the Crow. Fifty percent of those examined mention the reputation which has been established in the human mind that "Hawks steal Chickens." Twenty-one per cent speak of the Hawk as dangerous to small birds. The unclassified answers were such as: "It steals;" "Dangerous;" "Eats people;" "Take away children at times;"

"Injurious to small children." There is a man-raised notion that anything a Mouse, Crow, or Hawk assumes for its own use is stolen property. Stealing has been overemphasized. If we pick a blueberry by the roadside or cut a tree from our woodlot is it stealing? Hens lay eggs for reproducing their kind. Are we stealing when we take them to boil? The potato plant stores starch in tubers for reproduction. Is man purloining when he uses them for sustenance? There is the underlying principle of the rights of others. When studying Hawks we should get their point of view and when studying Chickens our focus must be on Chickens. The world needs training in these fundamentals which must first begin in a study of nature's laws at home. It might help him understand the other fellow's point of view and possibly temper his sentiments as regards the rights of a starving Europe.

What Color is the Robin's Breast?

The Robin Redbreast (Erythacus rubecula) of Europe is a warbler and is less than half the size of the Robin (Planesticus migratorius) of North America. The Robin Redbreast of the Old World has been described as having a yellowish-red breast. It has become endeared to the English by coming near to their homes in winter and has won a distinguished place in English rhyme and lore. A few of the colors mentioned by standard writers are given:

"Art thou the bird whom Man loves best,
The pious bird with the *scarlet* breast,
Our little English Robin?"
—*Wordsworth*, Redbreast Chasing the Butterfly.

"In the Spring a fuller *crimson* comes upon
the Robin's breast."
—*Tennyson*, Locksley Hall.

"Robin, sir Robin, gay, *red-vested* knight,
Now you have come to us, summer's in sight."
—*Lucy Larcom*, Sir Robin.

When the early settlers came to America they cherished in their minds the Robin Redbreast. When they espied the American Thrush with his home-loving spirit and chestnut hue it was an easy matter to transfer the title "Robin Redbreast" to our native species. In the same homelike fashion the bluebird was called the Blue Robin. The English colonists to India and to Australia

performed a similar feat. In each place of adventure a new species received the name "Robin Redbreast." It is not surprising to find that this idea of Robin Redbreast permeates the minds of American folks with an impelling force. It has a traditional partisanship with the English race; an endurance of three centuries on a new continent.

How do students of today answer the question,—what is the color of the Robin's breast? 42% say red; 17%, reddish brown; 15%, orange red; and only four out of 281 mentioned that there is a difference between the male and female. Other colors mentioned were orange, grey, pink, crimson, scarlet, yellow magenta, maroon, brick red, rustic red, and chestnut. The results show as much versatility as one could desire from a student career of nursery and rhythmic feeding.

The next step consisted of placing a male robin (The male is brighter colored) in a paper bag and cutting a small hole to show a small area of the breast. Eighteen graduates of various high schools were asked to write the name of the color. The answers were as follows: brown, 8; yellow brown, 4; grey brown, 2; red brown, 2; golden brown, 1; orange, 1. When observing the Robin's breast without the blinders of nursery rhyme no one called it red. The concealment of the Robin in the bag was unnecessary as no one recognized it when it was removed. When the group were told that it was a Robin one immediately said: "But the Robin has a red breast?" This little episode is typical. From time immemorial—today as of yore—we are led to view facts through the rims and spokes of tradition and hearsay.

Sentimentally none of us would abolish the phrase "Robin Redbreast." It has a home-spun attractiveness. Educationally, however it is important to know that red is red. We must see, not through the smoked glasses of nursery rhymes, but with a clear vision. Not that we will appreciate folk lore and Robins less but Robin Redbreast more.

That Robin Redbreast does not have a redbreast is representative of a group of contradictions in the language of natural history. The wing of the Red-winged Blackbird is not red; the shell of the Soft-shelled Clam is not soft; the Black Mussel is blue; the Starfish is not a fish; the Potato Bug is not a bug; Nuthatches do not hatch nuts; Flying Squirrels cannot fly;

Darning Needles are unable to darn; wormy apples do not contain worms; and waves are never, no never "mountain high."

How do Squirrels Open Nuts

The answers were as follows: with their teeth (60%); crack them open (18%); with their mouth (7%); gnaw them open (4%).

Contrary to prevailing opinion squirrels cannot crack nuts. They gnaw them open. It is interesting to note that amongst a hundred college freshmen (50 men and 50 women) this knowledge was limited to 12% of the men. The answers might indicate that the men get more of the outdoor experience. That 60% of those examined say teeth indicates that the question was: What is the principle organ used by the squirrel in opening nuts? This reply is typical of the many indefinite answers. Pupils should be trained to answer questions intelligently.

The origin of the idea that squirrels crack nuts is ambiguous. The fallacy is being perpetuated by first grade readers. There are evidences in literature which suggest that the terms teeth, crack, and nut are associated. Lamb in a letter to Wordsworth (August 9, 1815) humorously uses the term cracker in place of teeth,—"I conjecture my full-happiness'd friend is picking his crackers." Wilberforce in his life of S. Wilberforce (1868, p. 380) in describing the nose and chin said,—"She is a toothless, nut-cracker jawed old woman, but quite upright and active." The Penny Encyclopedia refers to nut-cracking Squirrels and Grove Matthew in his poetical work "The Most Famous and Tragical Historie of Pelops and Hippodamia" (1587) writes of "The little crack-nut Squirrels." The writer has been unable to find any such species mentioned in any scientific treatise.

When do Buds Form?

Even if one never observed that buds begin to form early in the summer they could easily reason this out as it is in summer that plants do their growing and form their various structures. In winter the buds are in a resting stage. In spring the bud may develop into a leafy shoot. Sometimes it develops into a flower or a flower cluster or it may produce both leaves and flowers.

The average per cent of the answers classified by seasons shows that fact and belief are very remote. Fall, 23.5%; winter, 24%; spring, 60%; summer, 8%. The percentages, in this case, add

to more than a hundred per cent as several pupils mentioned two seasons in which the buds could form. The majority of pupils believe that buds form in the spring. This is true until we get to the seniors in an Agricultural College and teachers just out of Normal School. The larger per cent of these students believe that buds form in the fall. That one quarter of the pupils think that buds form in winter may be due to the old proxy of things happening instead of growing. We must place more emphasis upon the differences between these two phenomena.

What do Buds Do in the Spring?

Buds begin to grow very early in the spring. Many people glibly say that they begin to "swell." This growth keeps up for several months. The scales then spread apart and fall off. Twigs set in water in the house show how slowly this process takes place.

Out of 191 answers 100 said that they *open*. 14 others said that they *burst open*. The use of the term burst was used almost exclusively by the female sex. 22 others said that buds *form* in the spring. The remaining 55 used such terms as *grow*, *bloom*, *unfold*, and *develop*. After looking over nearly 200 answers to this question one draws the conclusion that the majority of people have a mental picture of the bud and its "spring opening" as a sort of spontaneous generation. They believe that they burst open as mushrooms which are said to grow over night.

What is the Advantage of Horsechestnut Buds Having Varnish? Of Having Wool?

The varnish not only keeps too much water out which is rarely necessary but serves the more important function of preventing the tender leaves from drying out. The wool does not serve to keep out the cold since the buds freeze. The covering is a non-conductor and prevents *sudden* freezing and thawing. This "slow process" applies in the same way to the successful thawing out of frozen ears. The majority fall easy prey to the idea that varnish is to keep out the moisture and that wool is to keep the buds warm.

What is the Difference Between an Insect and a Bug?

In a popular way the term insect includes bacteria, spiders, and wood lice. A coral-polyp has wrongly been called a coral-

insect. A bug is thought to be synonymous with the word insect. Strictly speaking a bug is an insect which possesses a sucking-beak and belongs to the order Hemiptera. All bugs are insects but all insects are not bugs.

In no class were there less than 10% and in three classes at least 35% gave as a difference that *insects are smaller*. Probably the word connected up with a confusion that exists as to the meaning of the words insect, germ, and bacteria. However, in following the idea up with a request for a list of bugs and a list of insects the list of bugs consisted of erroneous examples, as: potato-bug, rose-bug, etc., along with the true bugs, such as: squash-bug and bed-bug. A less common notion ranging up to 20% of the class was that *insects fly* and bugs do not. A third difference, less pronounced, is that *bugs are hard-shelled*. The best answers were limited to seven pupils who recognized that a bug is a kind of insect. No one gave a more specific difference.

What is the Difference Between Daylight and Sunlight?

People are not apt to credit the light of day to the sun. Sunshine is the direct rays of the sun whereas sunlight and daylight may be direct, indirect or both.

The following are typical answers:

1. Daylight is light of day; sunlight, light of sun.
2. It might be daylight but the sun might not shine.
3. Daylight is a natural daily occurrence; sunlight only when the sun shines.
4. Sunlight, the sun shines; daylight, ordinary light.
5. Daylight is light before sunrise and after sunset.
6. Daylight comes after darkness but sunlight from the sun.

What is the Difference Between Shrubs and Small Trees?

Shrubs consist of several woody stems from the same root. Shrubby and scrubby in early use were often applied to trees having a stunted growth. A small tree has a single main stem.

The following types of answers form an interesting basis for analyzing the various degrees of mental reactions to the question.

1. Shrubs are sometimes plants and bushes and not trees.
2. Shrubs is a cluster of small trees.
3. All shrubs are not small trees.

4. Shrubs are a group of plants; a tree is one plant.
5. Shrubs have many limbs.
6. Shrubs are bushier than many small trees.
7. Shrubs never grow into trees.
8. Shrubs are bushes and do not grow very tall at any time.
9. Small trees will grow taller; bushes will not.
10. Shrubs are short chunky bushes; small trees are tall and slender after the shape of a large tree.
11. Shrubs contain more leaves and are larger in circumference.
12. Shrubs are thicker and branches close to the ground.
13. Shrubs are many trunked plants and small trees have one trunk.

What is the Difference Between the Lung Capacity and the Capacity of the Lungs?

Unfortunately there has developed in physiology a difference in these two expressions. By capacity of the lungs is meant the total amount of air that the lungs are capable of holding at one time but lung capacity means the amount that one can exhale at one time. There is always a certain amount of air left in the remote parts (not only the bottom part), of the lungs.

If any of the Following Statements are Incorrect Give the Correct Form

1. *Remove the shell of the oyster and look at the animal.* The shell is the skeleton of the oyster. The internal or soft parts are only a part of the animal. 81 substituted the word fish for animal. The oyster has no back-bone and is not a fish. Amongst the 281 examined only 12 recognized that the whole thing is the animal. Amongst the university freshmen five men and two women noted the difference.

2. *Earthworms rain down*—It would be nearer correct to say that earthworms rain up, for, as 153 stated earthworms come out of the ground when it rains. Five individuals changed the word rain to reign. This may be a result of the tendency of some schools to deal with words rather than ideas.

3. *Night air is "unhealthy"*—Nearly three-fifths of those examined recognized that night air is as "healthy" as day air.

4. *Flies carry typhoid fever*—76 gave the correction that flies carry typhoid fever germs which cause the disease. They do not carry the disease. One answered,—"Right—let's kill 'em."

5. *Mosquitoes bite*—It is rather a difficult thing to prove to some people that the mosquito does not bite. One man wrote "I know it." 73 wrote the fact of the case that they pierce and do not bite. It is also interesting to note that only "she bites," "he is a gentleman."

6. *Little flies grow into large flies*—An adult fly, when it comes from the pupal case is as large as it will ever be. Few people know that the fly does its growing when in the maggot stage. 37 of the people examined knew about the growth of flies.

7. *Man and animals eat food*—"Man and animals" is a common mistake. It should be "Man and other animals" for man is an animal. A total of 20 noticed the error. 12% of the men in proportion to 6% of the women of college freshmen recognized this.

8. *Oxygen purifies the blood*—The red corpuscles of the blood simply act as vehicles of transportation. They carry the oxygen from the lungs to the cells. Only five indicated that oxygen does not purify the blood. The purest blood in the body is the blue venous-blood as it leaves the kidneys.

9. *Oxygen builds up the body*—Oxygen tears down the tissues and thereby we obtain energy to do work. This knowledge was limited to twenty.

10. *Plants breathe*—Many believe that animals take in oxygen and give off CO_2 and that plants take in CO_2 and give off oxygen. Both respire and in the same way. Plants have the additional power of taking in CO_2, assimilating the carbon and giving off oxygen. Plants do not breathe. They do not have a respiratory movement.

About What is the Size of the Largest Animal Cells?

The majority of students believe that cells are always microscopic. Birds eggs are cells. The ostrich egg is the largest living cell. Nerve cells are often 2½ feet in length.

Where do Dragons Exist?

The answers may be tabulated as follows:

Students	Number	% saying don't exist	% saying in Mythology	Number saying in Woods	Number saying China, Africa
College	176	22%	27%	8	15
High School	102	43%	28%	3	2

The per cent saying that dragons do not exist, tabulated according to sex is as follows:

	Male	Female
College Freshmen	72%	58%
Junior High Schools	91%	56%
(Ninth grade)	98%	96%

These figures are insufficient to warrant an infallible conclusion but they suggest tendencies. To the young child, hobgoblins, cockhorses and dragon-like beings are quite real. In high school the dragon of Tanglewood Tales is explained as a myth. In college the earlier ideas have persisted, possibly subconsciously, but sufficiently indeed to mystify his mental activities. What an indictment against nursery rhymes should this prove true. On the other hand there is the possibility that students of college age reasoned out that the question as it stands is rather foolish. They concluded, perhaps, that what is really meant is where are dragons supposed to exist? However as the figures now stand they indicate that a far greater per cent of college freshmen than of grammar school seniors believe in the existence of dragons.

Is it possible that this is the result of a premature classical career? Is it due to a lack of ordinary scientific training as a basis? Literature is the artistic, aesthetic expression or belles-lettres of the evening and science is the working foundation of everyday life. Educators have for the most part placed literary courses at the beginning and science courses at the end of the curriculum. As a result students view facts through the fancies of literature. The situation needs investigation in order to discover the modus operandi by which ideas arise. Cure will follow the discovery of the mode of infection.

What Shape are Stars?

Stars are spherical and not star-shaped as one might suppose from representations on flags and Christmas decorations. The idea that stars are star-shaped decreases and the idea that they are spherical increases with higher education. The word round was often used for spherical. The per cent of answers may be tabulated as follows:

	Star-shaped	Spherical	Irregular
College and Normal School	31%	38%	6%
High School	59%	16%	9%

What do Bees Gather from Flowers?

The idea that insects gather nectar and pollen increases and the mistaken notion that bees gather honey persists into adult life although not to so marked a degree as in youth.

	Nectar	Pollen	Honey
College and Normal School	17%	32%	36%
High School	6%	22%	67%

What is the Use of the Hollow Stem to the Flower of the Dandelion?

The hollow stem is stronger than the solid stem.

Students Examined	Storage		Passage		Strength
	Water	Food	Water	Food	
College Freshmen (men)	8%	0	18%	28%	6%
College Freshmen (female)	0	0	4%	26%	0
Normal School Freshmen	6%	3%	15%	0	0

The table indicates that the majority think of the hollow stem as a passage way. Some think of it as a storage place yet they never see anything stored in the hollow part. Perhaps they think that the food mysteriously disappears upon cutting the stem.

Underline the Parts Which are Present in the Pussy Willow Plant

(The parts of a plant are root, stem, leaf, bud, flower, fruit.)

If one did not already know he might guess that all these parts are present in the pussy willow plant.

The highest average per cent and the lowest average per cent obtained by the various classes are hereby indicated:

	Root	Stem	Leaf	Bud	Flower	Fruit
Lowest	HSF 50%	HSF 61%	HSSO	HSF 61%	JH 21%	HS 0
Highest	JHS 100%	JHS 100%	NSG	NSG 86%	NSS78%	NSG50
		NSS 100%		CFM 86%		

Key:

HSF—high school freshmen
JHS—junior high school
CFM—college freshmen, male
NSS—normal school seniors
NSG—normal school graduates
HS—high school

What Relation is There Between Toads and Warts?

There is no relation. Only twelve of those examined knew friends who had had warts as a result of picking up toads. It is probably not a coincidence that these twelve were not limited to one such acquaintance. If they knew one they knew several. It is easy enough to obtain witnesses who have picked up toads

and never had warts and also the testimony of persons who have had warts and never handled toads.

Where do Hair Snakes Originate?

Although there is no such animal twenty-five students indicated the method by which hair snakes originate. Out of 50 men and 50 women in a college freshman class the idea was limited to 26% of the men. A state agricultural college and a class in high school that had had biology, contributed more means by which these animals originate than the other classes. Chamber's Encyclopedia (1753) speaks of animated horse-hairs as horse-hair worms.

The places where these fictitious animals were supposed to originate were such as: in dirt; in the body; in water; eggs; intestines of mammals; swamps; crossing of reptiles; among rocks. Dragons were also supposed to come from swamps and water. A swamp seems to be a mysterious place. Anything that is mysterious, ipso facto, occurs there. Such reasoning would give-way in a good course in nature-study.

(*To be continued*)

Nature News

A new star cluster in the Constellation Lynx has been discovered by Dr. Lampland of the Lowell Observatory and Professor Shapley and the staff of the Harvard College Observatory. This star cluster was discovered through photographs, and is one of the faintest and most distant known, and it established a new boundary in the starry heavens. It is 165,000 light years or 990 quadrillions of miles from the sun, and lies about two quintillion miles from the farthest cluster known to us in the opposite side of the skies.

A thirty-five year campaign for the preservation of the birds of paradise has just come to a successful issue, and we congratulate the Audubon Societies most heartily upon this triumph. For nine years it has been illegal to import bird of paradise feathers, but the Federal Government was compelled to prove that the feathers were smuggled before it could confiscate them. The new Tariff Act provides that the owner of the feathers must submit to confiscation or show proof that the feathers were im-

ported into this county before 1913. As a result of this Act, all the paradise feathers in New York and Chicago and other large cities were dumped upon the market at greatly reduced prices.

Stefanson reports that the northern islands of America are as hot or hotter than Brazil in mid-summer, although the sun never reaches a high point in the sky, yet because for six weeks it does not set, much heat is given out. For a short time vegatation grows as rankly in the Arctic regions as in the hotter climates. This exhuberance of plant growth, however, lasts only a few weeks.

The Harvard astronomers in studying the photographic plates made in Peru at the Arequipa Station of the Harvard College Observatory have discovered this summer more than 2,000 Nebulae and several new variable stars. They have also measured for the first time the distance and size of the large Magellanic Cloud which seems to be a universe of itself, quite separate from the Milky Way which is our own universe. Its distance from the earth is 110,000 light years, and we should bear in mind that a light year is six trillion miles. The longer diameter of the cloud is found to be about 15,000 light years.

Mr. Edward Hatch, Jr., has given to the N. Y. Zoological Society the Four Brother Islands in the Lake Champlain. Mr. Hatch has carefully preserved these islands as a haunt and a breeding place for sea-gulls. Through making this gift, he insures the keeping of these islands permanently as a gull reservation.

THE NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE IN ELEMENTARY SCHOOLS

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Editorial

How The Stars Help Us

Perhaps most of us find that the beauty of the stars is their most important use; this is well, for there is a sure uplift to the spirit in contemplating the starry heavens. When we consider that each star is a glowing sun, and that many of them undoubtedly have planets circling about them as does our sun and probably inhabited by thinking beings like those on our own earth, the thought is overwhelming and serves two purposes: it makes us realize our own modest place in the great scheme of things, and it brings to us anew a realization of the greatness of the underlying, all-permeating power and wisdom of God.

However, from the earliest times the study of the stars has been of practical use to the people of this earth; and at the present time we owe to the science of astronomy many practical helps. The study of the stars gives the nations of the world the accurate time. The stars are used by sailors in voyages around the world in finding their position in mid-ocean as well as in helping them to direct their courses. The tides are scheduled by astronomy, and to know surely when low or high tides are due at certain ports is of the greatest use to the captains of ships. Astronomers determine the exact latitude and longitude on the Earth's surface, and this enables us to make accurate maps of islands and continents, and also helps to settle boundary lines between nations. It may not be generally known that the boundary line between Canada and the United States from Minnesota almost to the Pacific is the imaginary line called the 49th parallel of latitude, and the astronomers determine where this line falls with an accuracy that does not vary more than 10 or 15 feet. It is one of the most encouraging facts in History and must make the "stars

smile" to know that this imaginary line between two nations has never had a fortification along its length for more than a century since it was established.

Why not Adopt a Star

It is really a great satisfaction to have a star of one's own. The astrologers from earliest times have been accustomed to give us planets of our own,—the ones which they declare presided over us at our birth; however, this is a compulsory act and it is much more attractive and interesting to make it a voluntary one on our own part. As a matter of fact many people have confessed that among the myriad stars of the skies there was one that seemed more interesting and intimate in a personal way. We confess to two favorites, Vega in the summer and Sirius in the winter. Both of these give us a special sense of joy and companionship and yet the two are very different. Vega has a lofty personality; if she were a woman she would be a madonna carrying lilies; while Sirius is like a knight of olden time in glittering armour going forth on a white charger to help straighten the crooked places in the world and raise the lowly and reward the virtuous. That greatest of poets, Robert Browning had a star of his own and we have always thought that it was Sirius; this poem expresses more fully than anything else that we know this personal relation between a mortal and a star.

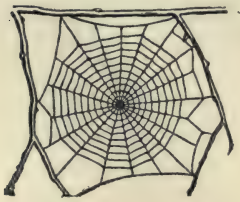
All that I know
  Of a certain star,
Is, it can throw
  (Like the angled spar)
Now a dart of red,
  Now a dart of blue,
Till my friends have said
  They would fain see, too,
My star that dartles the red and the blue.

Then it stops like a bird; like a flower, hangs furled:
They must solace themselves with the Saturn above it.
What matter to me if their star is a world?
Mine has opened its soul to me; therefore I love it.

The American Nature Study Society and The School Gardening Association

At the meeting of the Massachusetts Council of the supervisors of Nature-Study and Gardening held in conjunction with the N. E. A., last July, Mabel E. Turner, Secretary of the Massachusetts Council was appointed as a representative of that body and Van Evrie Kilpatrick, Supervisor of Gardening in the City of New York was appointed as a representative of the School Garden Association to meet with the representative from the American Nature-Study Society, and confer concerning a plan to unite the two. These representatives are to report back to their respective organizations at the next meetings.

Members of the American Nature-Study Society who have opinions in favor or against the amalgamation of these two societies are earnestly entreated to write the same to our President, Dr. William Gould Vinal of Rhode Island College of Education, Providence, R. I. These letters should be in Dr. Vinal's hands by the first of December, as the question will come up for action at the Boston meeting during the Holidays.



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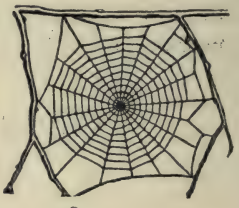

Dr. Vinal, the President of the American Nature-Study Society is par excellence a teacher; and he is all the more excellent as a teacher because he has a fine sense of humor which he uses wisely to allay the sting of criticism instead of using it to sharpen the "pointed shaft" as do many critics. Moreover, his criticism is always constructive and we have faith that the mistakes that he lists in his contribution to this number of the REVIEW will serve to make us all more careful and accurate in our statements and phraseology.

Dorothy Purdy Hillas is a lover of nature and has artistic tastes and ability as well. She and her husband are both recent graduates of Cornell and both are devoted to the life out-of-doors and enjoy together what Mother Nature so gladly reveals to their unsealed and sympathetic eyes.

Dr. Leon Augustus Hausman is a zoologist; he has been an instructor in zoology and biology at Cornell and now has a teaching and research position in Rutgers College. He has already won a name for excellent work among scientists and is an authority upon the structure of the hair of mammals. His wife is Ethel Hinckley Hausman, who has often contributed to the REVIEW. We wish that Dr. Hausman had more time to give to the writing of poetry which in our opinion is of very high qualtiy.

Miss Eva Marian Provost is the kind of teacher all too rare in our public schools. She is a woman of refined and charming personality and is intensely interested and devoted to her work as a teacher. Her teaching subjects are wide in range including English and art; but whatever she teaches she enriches with her knowledge and love of nature. For years she led a volunteer bird class consisting of her pupils, to the Brooklyn parks each Saturday. The series of astronomy charts made by her pupils are remarkable for their beauty, accuracy and workmanship.

Gladys A. Harper is at home in Yardley, Pa. She is a teacher of first grade pupils and believes there is nothing too good for her little folks. Therefore she has prepared herself in nature-study so that she may make their lives more interesting.

The New Heavens: George Ellery Hale, 88 pp. Illustrated. Scribners Sons. Price $1.50.

Dr. Hale is director of the Mount Wilson Observatory of the Carnegie Institution of Washington, and as we might expect he presents the New Heavens from the angle of "why new?" Strange as it may seem the heavens which were at the beginning and always have been are now being revealed day after day and night after night as new. It is most interesting that the oldest of all the sciences, Astronomy, is at the present time moving on faster than almost any other; this is largely due to the physicists who have turned their investigating eyes outward and upward. The photographic telescope and the spectroscope have revolutionized our ideas of the stars, the former revealing unsuspected stars in space, the latter giving us the chemical analysis of a star, the rate at which it is moving, approximately its temperature, and in many instances its distance from us. Dr. Hale views all of this progress and then proceeds to give lucid descriptions of the modern telescope and its achievements. There are three chapters in this remarkable little volume, the first is *The New Heavens* and discusses the early instruments, the modern methods, refractors and reflectors and their relative values, and the 100″ telescope. Chapter 2nd deals with the *Giant Stars* and their measurements and includes a description of star images, the measurement by the interferometer which is the method used by Professor Michelson in measuring Betelgeuse, with a description of the latter and also of Arcturus, and the star Antares which is the biggest one yet measured as it has a diameter of four hundred million miles; Dr. Hale's discussion of stellar evolution is especially interesting and edifying. The third chapter on *Cosmic Crucibles* includes an account of solar helium, the sun spots as magnets, the Tower Telescope, stellar chemistry, astrophysical laboratories, Newton and Einstein, transmutation of the elements, cosmic pressures and the practical value of researches on the constitution of matter.

The book contains many illustrations and is as attractive as it is instructive. I am sure we are all grateful to Dr. Hale for giving us this clear and valuable resumé of the recent investigations in the field of astronomy, and we are pleased to note that he dedicates the volume to his wife.

The Sky Movies: Gaylord Johnson. 170 pp. with over 100 pictures. The MacMillan Company. Price $1.50.

The author of this attractive little volume has taken great pains to make children understand our earth as a globe, its movements, the moon, its relation to the earth and its movements. It begins like a fairy story with a fairy ring presided over by a wise little Puck who gives the children a lovely story about Istar, the Moon Princess, but also gives them much valuable information. The scene is laid on grandfather's farm and the actors are Peter and Paul, twins, and Betty, their sister. There are also very nice grandparents and a sympathetic Uncle Henry. However, despite the fairy-tales and the mind pictures spread on cobwebs, the book is filled with practical information of the most reliable sort. The illustrations are most helpful and interesting especially valuable are the series of photographs of the moon in all its phases taken from photographs made at the Yerkes Observatory. How we prove that the world spins like a top, how to make and understand a sun-dial, how the star clock tells time, the arrangements and movements of the planets made into a play; all these and many other things are explained, illustrated and made plain in this attractive book.

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OFFICIAL ORGAN OF THE

American Nature-Study Society

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Buster was a more courageous leader of the flock than this goat

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THE
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Buster Brown, A Sheep—100% American

CHARLES SMITH,
Big Trails, Wyoming

"Buster" was born, out on the Wyoming range one cold bleak day, in the early part of May in the year 1916. When he was six days old his mother died from eating "poison-weed," as the various poisonous plants are called. Deprived of his mother he became a "bum," his only chance for food was to "bum" from other lambs when their mothers were not looking.

The herders tried to get him a "step-mother" by "jacketing him;" which is done by placing the skin of a dead lamb over him, but he was such a big husky lamb, that it was almost impossible to keep these jackets on him, and the ewes would not own him, tho he was put with three or four. He managed to exist for about a month, then he was taken to the ranch where he was under the care of the lady of the house, and he soon became a great pet; he was affectionate and for a sheep very intelligent.

He was given all the milk he would drink and all the oats he wanted. He had the freedom of the place where he helped himself to grass and browse.

When he was six months old he was a beautiful lamb, much larger than the lambs that were with their mothers in the flock.

He was put back in the herd where he soon made friends with the herder and never failed to come to the door of the camp wagon for his breakfast. The herder, when cooking his own breakfast, would cook one extra pancake or two for Buster; he will eat them quite hot and seems to like them best with a little syrup on them, tho he doesn't like butter. He will eat almost anything a person will eat except meats. In the first part of the war the

"American Sheep Breeder" sent out letters to the flock-masters of the range country, asking them to give two fleeces from their flocks, to be made into blankets, for wounded soldiers in France. Buster's fleece was chosen as the very best among several thousand. It was snow-white, crimpy and full of "yolk" as the grease in wool is called: it was sent to Chicago by Parcel Post. It was the intention of the editor of the "American Sheep Breeder" to have these fleeces woven into blankets, but afterward he thought it best to sell the wool and buy blankets with the money.

Buster getting his pancake for breakfast

The wool was placed on the market, and the firm of Silberman and Son of Chicago paid one dollar a pound for this wool—Buster contributed twelve pounds.

His next fleece was given to the Red Cross and it was auctioned off for one hundred dollars. This made him famous, he became known as "The Red Cross Sheep." Large sums have been offered for him. Every herder in the countryside knows him by sight, and will fight for him at a moments notice.

All his fleeces have been given to charity, except his last one, which wasn't very good and only weighed seven pounds (his heaviest fleece was fourteen pounds).

It is the custom with many herds to keep two or three goats for leaders to cross streams and follow bad trails as they are considered braver than the sheep.

During the last two severe winters when the sheep were being forced through the deep snow in order to get them to food and shelter, Buster would cheerfully take the lead and break trail for miles when the goats could not be made to budge. But he is now enjoying a well earned rest; he considers himself one of the family and does pretty much as he pleases, the best known and most loved range sheep in Wyoming; and like the true veteran he is, he never says a word about the way he did his bit in the world war.

Buster and two of his friends

Photo by L. H. Bailey
An Avenue of Mahogany Trees in Venzuela

Mahogany

John J. Birch, Pd. B.

Schenectady, N. Y.

There is perhaps no wood more cherished for cabinet purposes than mahogany. Its fine tracery of dark and light brown lines, which become more and more pronounced with age and polishing, together with its freedom from warping or twisting in seasoning, has given it the high place which it occupies amongst furniture woods. It is a native of the tropics. Contrary to the prevalent

belief it does not grow in great forests; but is sparcely scattered thru the tropical jungles. A bulletin of the National Union of the American Republics states: "There is no such thing as a forest of mahogany. The pine loves its own kind, and never thrives better than when planted by nature or by man, one tree next to the other, for mile after mile, on plain or mountain. Other trees are found in groves or clumps, seeming to form little settlements within the woods. The mahogany tree, however, lives by and for itself alone; standing solitary of its species, surrounded by the smaller trees and dense undergrowth of the tropical forests rearing its head over its neighbor." Very often it occurs that only one or two trees may be found per acre.

The Lumbering Outfit

The personnel of a mahogany lumbering outfit is the same in many respects as a lumber camp in any American forest, save for minor details. Belize, in British Hondurus, is the chief exporting city for mahogany, and for that reason most of the outfits are made up from there.

The methods used in harvesting are exceedingly primitive, inefficient and relatively expensive. The cutting begins in the mid-summer, which is the rainy season. The tree hunter, or the one whose duty it is to locate the trees, is by far the most important man in the outfit. His first move is to pick out some elevated point and climb the highest tree and from there locate the mahogany. This is a comparatively easy matter, for at this season of the year the leaves of the mahogany have turned a reddish yellow hue, while the other trees are green, thus making a decided contrast which is visible for a long distance. After having carefully noted his bearings, he proceeds to locate the trees. This is by no means an easy task, for in most places the underbrush is so dense that it is necessary to actually chop one's way thru.

The trees are large and spreading with pinnate, shiny leaves. They range anywhere from fifty to one hundred feet high and from ten to twenty-five feet in circumference at the base, depending on their age. It is the custom to build a platform, some eight or ten feet high around the largest of the trees for the reason that the trunks are greatly enlarged at the ground. But by so doing, a great deal of the most valuable wood is lost, for it is here

that the most beautiful graining and toughest timber is found. In felling, great care is taken so that the logs will not split or break, thereby enhancing their value. The trees are then cut into convenient lengths to be handled and squared so that they can be more easily stowed away in ships.

By this time the dry season has begun, and while a part of the gang are engaged in cutting, others are at work preparing roads and bridges to enable the logs to be transported. The trucks used for hauling are two wheeled affairs, constructed on the spot, save for the axles and hubs, which are brought in by the lumbermen. Oxen are used to haul these improvised wagons. The work is done mostly at night, by the aid of pine torches, for the reason that it is cooler at that time. The logs are collected on the banks of the rivers and left there until June, when the rainy season sets in. At that time they are cut loose and allowed to float down stream. A gang of natives in flat bottomed canoes follow the logs to see that none are lost. When they have arrived at their destination, each owner collects his logs, which are marked by certain distinguishing marks on the ends. They are then prepared for export by cutting off any battered ends or split portions. The natives tie them together and raft them to the ships, where they are placed aboard. This is a dangerous operation, for in rough weather, many of the rafts are broken up and the timbers carried out to sea. In the majority of cases they are carried by the ships to London, which is the mahogany center of the world, and from there dispersed in smaller quantities.

Differences in Mahogany

The wood is generally classified under two heads: the Spanish mahogany and the Hondurus mahogany. The former composes the richly colored, solid, heavy varieties, which are sought after chiefly for furniture veneering. It is susceptible to a high degree of polish and when properly treated, a rich wavy figuring is brought out. The Spanish wood is the produce of the island of San Domingo, whence only small quantities come at the present time. Cuba, furnishes a much larger log, which is only slightly inferior to the San Domingo, and is classed as Spanish wood. It can be partly distinguished by the white chalk-like specks in the pores and is cold to the touch.

The Hondurus mahogany is lighter, opened grained and more uniform in color; almost devoid of figuring or curl. There are black specks or lines in the grain, which are characteristic only of that variety. It is valuable, where a sound straight timber free from all tendencies to warp is required. Alkalies are often applied to this, especially to the lighter colored wood, in order to deepen the shade, and in this way it often replaces the better grade of wood.

The logs are often forty feet long and from two to three feet square. They are obtained from the low, moist land and are generally soft and coarse. This variety is used as a foundation on which to veneer the finer varieties, and from its spongy nature it is admirably suited for this purpose, for the reason that the pores aid the glue in adhering thereto. Aside from this, it finds a large use in pattern making, small turning work and shipbuilding. The trees growing in the North, near the Mexican border are much richer, more dense and solid than the lowland timber.

Some authorities have supposed the Hondurus to be a different species from the Spanish, because of its lighter color as well as the porous texture; but it is now believed that these differences arise from the different situations in which the trees are found.

In Mexico, the mahogany tree attains its greatest dimensions. Squared logs of from forty to forty-eight inches are infrequently obtained, although the average are from fifteen inches to three feet, cut in lengths of from eighteen to thirty feet, for convenience in shipping. The wood in general is plain and somewhat soft at the core, resembling the swamp variety of the Hondurus wood; although timber grown on the upland provinces, especially Tobasco, is firm, solid, and not unfrequently richly figured.

The Discovery of Mahogany

A carpenter on Sir Walter Raleigh's ship is credited as being the first person to have noticed the superior qualities of the wood. He was attracted to it because of its great beauty, hardness and durability. Dr. Gibbons, a physician of London, in 1720, was presented with several planks brought from the West Indies. He employed a cabinet-maker named Wallaston, to construct some small articles from this wood, and dating from that time it has been highly cherished as a cabinet wood, due to its soundness, large size, uniform grain, durability, beauty of color, richness of figure, which is improved by age, and the ability to take a high polish.

The Pig

Helen E. Murphy

Phoenix, N. Y.

The wild hog that once roamed over Europe, Asia and Africa, is the ancestor of our common domesticated pig. It likes situations where it may wallow in the water and mud; but it also likes to have close by, woods, thicket, or underbrush to which it can retire for rest and also when in danger. The wild hog is extremely active and powerful; it is fierce and dangerous, particularly when old. Iron gray or dirty brown in color, spotted here and there with black, it is well concealed in the underbrush, and the thick skin covered with stiff bristly hairs is a fine protection from thorny thickets. When excited or angry, these bristles rise and add fury to its appearance. Twilight, night and early dawn are the favorite times for feeding upon plants, fruits and roots, for sport; for fighting; for adventure. Provided with a bony, wedgeshaped head, a snout that is pointed and also the seat of a highly developed sense of smell, jaws set with strong teeth, a neck that is long and muscular and loins broad and strong, the wild hog is excellently adapted to look out for itself.

Hunters of wild hogs declare that they are full of cunning and strategy, and we must admit that the domesticated pig of today is very clever. All it needs is a chance. With an affection that causes it to follow a person like a dog, and a memory such that it can be trained to play Yankee-doodle on a violin, we must admit that the pig has brains. The trouble is that most of the time it is so stuffed with fattening foods that no opportunity is given to use its brains, except once in a while when it squeezes thru the fence, and we strive vainly to get it back. Then it remembers to forget everything.

By nature the pig is very neat; but since it has come in contact with civilization, it rarely gets half a chance. Sparsely clothed with bristles and hair,—flies and other insects bite it unmercifully, and it has to wallow in the mud to rid itself of these pests; but this wallowing is in the nature of a mud bath, repeated only at intervals.

The pig has a most unique and beautiful digging apparatus, happily placed on the end of his nose, where it is backed by all

the pushing power of a stout body, and where it is directed in its operations by the aid of very keen olfactories. This is a most efficient equipment for digging. If anything good to eat is buried in the earth, trust the normal pig to find it. But alas! when a little bit of metal ring is thrust into the sensitive base of the "rooter" this beautiful contrivance fails to operate, his pigship is reduced to the common level of all mammalian kind, and he is left endowed with only his appetite.

When allowed to roam in the woods, the pig lives on roots and nuts, especially (the latter) acorns and butternuts. In the autumn he becomes very fat. In the wild state this was evidently a provision of nature for the hardships of winter. It is this characteristic that makes the pig useful for food.

The domesticated pig is well fitted for locomotion on either wet or dry soil, for the two large, hoofed toes enable it to walk well on dry ground, and the two hind toes, smaller and higher up, help to sustain it on marshy soil. If not too fat, the pig is a swift runner in spite of its short legs.

We can understand a little of the pig's conversation. There is the nasal growl when fighting and the squeal of terror; the constant grunting that keeps the herd together, the complaining squeal of hunger, and the satisfied grunt signifying enjoyment of food.

Today there are black pigs with white markings that have ears standing erect; there are black pigs and white pigs with drooping ears; chestnut pigs with drooping ears; white pigs with erect ears; there are pigs fat and pigs lean; there are large pigs and medium pigs and small pigs, but

> "The nice little pig with the querly tail,
> All soft as satin and pinky pail,
> Is a very different thing by far
> Than the lumps of iniquity big pigs are."

A Potato Beetle Chronicle

MILLIE RUTH TURNER

Wilkinsburg, Penn.

CHAPTER I

THE EGG

9:30 A. M., July 8, 1921.

Professor Detwiler gave me a potato leaf that had a patch of yellow eggs on the under side. These eggs are about one-sixteenth of an inch in length, and thirty or forty of them are arranged on end in a compact group. Truly the potato beetle is in the same class as the "Great Discoverer" when it comes to making eggs stand upright.

11:00 A. M.

I carried the eggs home with great care for fear of scrambling them and put them on a desk. When my landlady is at leisure I am going to get a bottle from her for them.

12:00 A. M.

No change in the eggs. Perhaps the sun was too warm for them when I carried them from the field.

3:00 P. M.

I went to town and did considerable shopping, but the eggs remain the same, as fixed as the pyramids.

4:00 P. M.

Still no change. I have watched them very closely for over an hour. Now I am going to dine with my Algerian friend, Miss Mege, who is much more entertaining than bugs' eggs that refuse to hatch. But it may be that the poor things are poached, for it is 106 in the shade.

The Eggs

11:25 P. M.

No change. They may have T. B. A student told me to-day that lack of "pep" was one of the first symptoms.

7:30 A. M., July 9.

No change. This history is going to be dull. Could it be possible that these young beetles are defectives and lack the intelligence to find their way out of the shells?

10:30 A. M.

I have searched the library to find information on the incubation of the potato beetle, but was unsuccessful. I learned, however, that this beetle is a native of America. It was first discovered in the Rocky Mountain region, where it fed upon the sand burr or Solanum rostratum.

In 1859 it acquired a liking for potatoes and began to be a pest in the potato fields of Colorado. From there it traveled eastward advancing, at first, about fifty miles a year but later more rapidly, and in 1874 the insects reached the Atlantic Coast.

3:43 P. M.

No change. I put several moist leaves into the box. The air may be too dry for the eggs.

4:00 P. M.

I had the misfortune to upset the eggs on the floor. Perhaps that would addle them. If it were not for this cruel blister on my heel I would go to the field and get a new setting of eggs.

9:48 A. M.

No change. I have just read this history to Mr. Stout, a blind man who is quite well versed in the ways of bugs, and he assured me that there might be no change for two weeks.

Shade of Virgil! How can I write a history if nothing happens?

9:27 A. M., July 10.

All's quiet along the Potomac. To-morrow I am going to carry the eggs up to Robert's Hall and look at them with a microscope. That will show if any of them are chipped.

5:57 P. M.

There has been no change, and it was a good day for hatching too, warm and damp.

The young man in the room next to mine played some weird music that sounded like two wire hair pins being scratched with a rusty nail. I had hopes that the beetles would come out to get away from it, but they didn't. They were also serenaded by a phonograph played by a nearby neighbor boy. My landlady told me that his mind is weak. I could not help wondering if it had lost its strength after hearing his records. No matter; these musicians have added to my scientific knowledge. Potato beetle eggs are absolutely lacking in musical appreciation.

9:55 P. M.

Eggs remain just the same. They had such a parched look that I put them out of the window on the porch roof in the rain.

10:00 P. M.

I have brought them in again but they do not look much refreshed. To-morrow I shall take them to class and get expert advice about them.

8:15 A. M., July 11.

Professor Detwiler looked at the eggs and pronounced them sound. I had put several rain drops from an elm leaf over them. He said not to bathe them any more, and that it might require eight days for them to hatch.

I found a bottle and I intend to put them into it, set them on the window sill, and not look at them again until I hear them chirping.

10:35 P. M.

Great excitement! I believe they are hatching! There are four black spots on the eggs that were not there this morning If we were in Pittsburgh I would know it was soot but in Cornell it must be bugs.

10:45 P. M.

A microscope! A microscope! My kingdom for a microscope!

11:00 P. M.

I feel sure they are hatching. I wonder if they want to eat as soon as they are hatched. The potato field is a good mile away, besides the potatoes were to be sprayed with poison, so I wouldn't dare go there. I have heard a great deal of talk about "Mellin's Food and Eagle Brand." Perhaps these would do.

CHAPTER II

The Larva

8:20, July 12.

The black specks were larvae. Professor Detwiler's fine three-hundred dollar microscope showed them plainly. The little fellows were so enlarged that they looked as large as the adult larvae appear to the naked eye.

They are certainly fine specimens, too. Without doubt they would be 100% perfect at any "Better Baby" show.

I called the one that was most nearly hatched Columbus because he landed first. The next two to emerge I shall call Ferdinand and Isabella, because in history, Columbus couldn't have landed without them.

9:00 A. M.

The question of food arose and Professor Detwiler solved it by leading the way on a foraging expedition to a deserted garden where we found a potato plant left blooming alone among the weeds like the "Last Rose of Summer." If the world were in the hands of men like Professor Detwiler there would be no starving babies in the near East.

Well to come back to the potato, we got a top from the stalk and I put the dried leaf with the hatching eggs in the center, and went home,

10:10 A. M.

When I reached home, I looked for Columbus in the nest, but behold he was not there, I was alarmed thinking I had lost him, when I spied him like the "Great Admiral" out upon an exploring expedition.

In the short time I had spent getting the food, he had grown from an almost invisible speck to a regular larva, and could walk and eat. He had increased his size many times. It is said that

these beetles live as larvae for two weeks. If this wonderful growth continues for that time Columbus will be so large I can saddle him and ride him to class.

8:00 A. M., July 13.

There are three young beetles out. I threw the rest of the eggs away for they looked as if they might have hardening of the arteries, besides three orphans are enough when the food supply is so far away and so limited.

11:15 A. M.

I came home just in time to rescue Columbus from a watery grave. He had fallen to the bottom of the glass and was struggling for life in about seven drops of water. I flew to the rescue with the point of a pencil, but he wouldn't touch it, so I built a wharf with a potato leaf, and he landed in state.

5:15 P. M.

The triplets seem to be at a stand still. This would worry me but I have learned that larvae grow very rapidly for a short time, then the chitin in the cuticle hardens and growth is difficult. When the skin becomes very much crowded it splits, the larvae crawl out with a new skin and growth continues rapidly again for a time, then the molting is continued.

If these larvae have molted their discarded skins are so small that I cannot find them. Some bugs leave skins so large that counting the molts is not difficult.

11:00 A. M., July 14.

The young orphans seem happy and well, but their backs are getting so humped. They need a lesson from Miss Todd in correct posture.

10:00 P. M.

These babies are going to be brought up according to scientific rules; no cuddling, no rocking, and no lullabies. With the average child these rules are a flat failure, unless the parents are deaf or lazy or both, but with potato larvae they work like a charm for the three are asleep under a leaf. I have always heard that insects have an economic value, but I never appreciated it before. Since studying the larvae of the three lined potato beetle and the interior of a caterpillar my bill for food at the cafeteria has been reduced from $1.20 per day to $.33, and dear knows what a reduction the interior of the caterpillar will make.

July 15, 1:35 P. M.

Isabella has disappeared! I have searched every place for her but in vain.

Larvae of Colorado potato-beetle

Yesterday I found the larva of a tortoise-shell beetle, and put him on the plant with the other larvae. Later I found him in the exact spot where I had last seen Isabella. I thought he was a vegetarian or I would never have brought him home.

Of course I couldn't prove that he had eaten Isabella, but neither could he prove that he hadn't; so I convicted him upon circumstantial evidence and threw him into the back yard.

Now I must be doubly careful of Columbus and Ferdinand for a life history of these beetles must be forth coming if I am to succeed in this course and succeed I must for I have heard dark hints of an ordeal called by the vulgar term "busting" that Cornell students who fail must endure.

4:00 P. M.

I have just had a great shock, two shocks in fact. The first was when I saw a fly resembling a house fly hovering near my larvae. I drove him away in haste for there is a fly that lays eggs on the backs of potato larvae. These eggs hatch into parasites which feed upon the potato larvae and kill them during the period of pupation.

I couldn't see any on either of my little fellows and I rubbed their backs with my finger but could not feel any either. If these larvae develop parasites something is going to happen to that fly.

The other shock was when I went to brush a little red speck off a paper I was writing on, and just as my hand struck the speck I recognized Columbus. He was rolled over several times but for-

tunately not crushed. He feigned death for a few minutes in true potato beetle style, and then continued his exploring. I put him back on the potato plant and he seems as good as new, but if he doesn't stop this running off I shall resort to the old Spanish plan and put him in chains.

6:30 P. M.

The twins are fast asleep. I shook the leaf and touched them but they never moved. This denotes well controlled nervous systems.

8:55 A. M., July 16.

The food supply was so low that it demanded immediate attention, so this morning, I walked to Cornell gardens for some potatoes. These gardens used to be about a mile away, but last night someone moved them away over into New Jersey and I thought I would never get there.

Some man named Tommy from Cleveland was clearing the ground away from some beets preparatory to making pictures of their roots. I told him about Isabella and he said that without doubt the tortoise-shell had eaten her, for some insects are so savage that they eat each other. Never again shall I install a perfect stranger in the bosom of my family.

10:00 A. M.

I finally got some unsprayed potatoes from a little boy and put the larvae on them, where they are now taking a very hearty meal.

The little chaps are about the size of a lady-bird beetle and a beautiful red with black legs and heads, and each has a black ring where the thorax and body are joined.

No doubt they have molted several times but the cast off skins are not visible.

I have discovered that bug observations should never be taken before or after a full meal.

5:00 P. M. July 17.

Columbus and Ferdinand seem to have decided that their chief aim in life is to see how much they can eat. It is surprising how they have riddled the leaves that were put in yesterday.

They are five days old now and in about ten more days they should pupate. They do this by going down into the ground and making a little cell out of the soil.

July 18.

I was so hurried this morning that I forgot to look at the "wee beasties" until after dinner, but they did not seem a bit offended and were eating away very cheerfully.

They are about half grown now and appear to my untrained eyes to be quite normal. Miss Mileham, a trained nurse who has a room below mine, has told me so much about childish defects that give distress in after life that I am going to have her give them a complete physical examination.

To blight their young lives by neglecting their tonsils or adenoids would be unforgiveable.

July 19.

Columbus and Ferdinand have been with me for a week now and never a cross word from either of them.

July 20.

Every thing is going like clock work, splitting and eating, and eating and splitting.

I was out of food again and Professor Schneck told me I could feed them sprayed potatoes if I washed them well. I got some leaves and washed them until they were almost worn out, but the larvae didn't like them and set out in search of pastures new, so, Mr. Stout and I walked up to an unsprayed garden and got a tender top. I put them on it and they began to eat like hungry hunters.

In moving the glass I accidently knocked Ferdinand down to the hard floor. He fell about four feet, and my first thought was that his spine was broken, then I remembered the kindly chitin that protected his spineless body. I put him back on the plant and he recovered in a few minutes and continued eating.

I have figured out this fall, and to have one in proportion I would have to fall 1056 feet. I can't imagine myself two minutes after a fall like that sitting up eating potato leaves. Wouldn't chitin be a great thing for the aviators?

July 21.

The larvae are so well developed that I expect them to pupate almost any day. In order to have every thing ready, I have put some soft ground in the glass. There is nothing like surrounding the young with the proper environment.

CHAPTER III.

The Pupa

July 21.

I have just been watching Columbus and Ferdinand swinging from leaf to leaf. It is marvelous that they are able to support their great bodies on such tiny legs, seemingly as great a task as if I were to swing across a seven foot chasm with Bailey Hall on my back. Think of a mule with the proportionate kicking ability of a flea beetle.

Ferdinand looks queer. The skin on his back is dry and wrinkled. He is restless and not pleased with his food.

I put the glass in the window but neither he nor Columbus liked the cold air. Ferdinand hid himself in a curled-up leaf and Columbus got behind a stalk.

July 23.

This morning I found Ferdinand on the ground at the bottom of the glass with his head buried in the mud. I put him back on a leaf and washed the mud off his head. He moved his front legs as though he were greatly disgusted with me and rolled down to the ground again. I put him back once more but he climbed down with such great deliberation that I decided he knew what he was about.

I watched him and he began to part the earth with his feet and to work his way down into the ground. Then it dawned upon me that it was time for him to pupate and he was digging himself a grave. I flew to his aid with a hair pin, but again I failed to please for he moved off and began in a new place.

It was the strangest funeral I ever saw. No undertaker and the corpse officiating. It made me think of the poem commemorating the burial of that gallant Englishman, Sir John Moore, of course it wasn't "darkly at dead of night" but like

> "No useless coffin enclosed his breast,
> Nor in sheet nor in shroud we wound him,
> But he lay like a warrior taking his rest
> With the mud drawn up around him."

I changed the last line. That is poetic license.

July 23, 6:39.

Columbus' back has the same parched look that Ferdinand's had when he went into the ground. I suppose Columbus will dis-

appear soon. He is such a pretty little fellow with his rows of black spots down each side like rows of shiny buttons.

I have heard so much here about evolution. I wonder if these spots could be buttons "evoluting." They certainly have great advantages over buttons, for no laundress, however willing, could wring them off or crack them like a nut with the iron.

July 24.

Columbus is gone. I looked for him the first thing this morning, and hunted every place but found no trace of him: so, I decided that he had gone down to join Ferdinand. I examined the ground but there was no clue to his whereabouts. "No man knows his sepulcher." What faith these little creatures have.

July 25.

Over the glass I have erected a little sign that reads,

> "Here lie Columbus and Ferdinand
> Deeply buried beneath the sand,
> Think not, dear reader, this ends your woes,
> They've only retired to change their clothes."

Some of the students dig their pupae up every day to see how they are getting along, but this seems like such a ghoulish trick, I am going to let mine rest in peace and besides, patient reader, you need a rest, too, so look at these stars until you hear that Columbus and Ferdinand are up or have at least sprouted.

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CHAPTER IV

The Beetle

Aug. 9.

During all these long days, there was no sign of life in the glass where Ferdinand and Columbus had gone down.

Once I tried to scrape away the earth from them but my heart failed me. I so dreaded breaking their little wings. But this morning the suspense was too great and I bribed a student named Miss Clark to dig them up. She went at the task with a stout heart and a pair of pincers, and soon unearthed a perfect beetle. He was sitting so still that we were unable to be sure he was alive. I called him Ferdinand for he was in the same place where his royal highness had buried himself. Columbus was no place to be seen, so this is another case of history repeating itself, for you will remember that no one is quite sure where the bones of the "Great Admiral" rest.

10:00

I got a spray of night shade and placed it in the glass all ready for Ferdinand. Surely he will have a fabulous appetite after his long fast.

11:30.

Ferdinand is up! Perfect in every way and a great beauty. He is not hungry at all and took only a few bites of the leaves. It seems that most of the damage is done by the larvae.

This is the last stage in Ferdinand's life. Hasn't it been wonderful to watch the development of this little creature from the tiny egg to the adult beetle?

Surely no one with an understanding heart could see these marvelous changes and not gain a richer appreciation of the great truth "I am the resurrection and the life."

O Silver Moon

LOTTA O. SLOAN

O Silver Crescent on a field of blue,
I wonder what I should find in you
Could I but get a nearer view.
Would I to your secret get a clew?
Beautiful
Silvery
Crescent Moon!

O Silver Moon, in your starry domain,
Are there peoples, too, on that far away plane,
Mountains and valleys, forests and plain,
High above the clouds and the rain?
Beautiful
Silvery
Crescent Moon!

O Silver Crescent on a field of blue,
May I not join your retinue,
And your starry Westward way pursue
When I to earth shall bid adieu?
Beautiful
Silvery
Crescent Moon!

Common Mistakes in Natural History

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(Continued from November issue)

How do Weeds Get Into Gardens?

The majority of weeds are annuals and come from seed.

52 think that weeds just grow in the garden *a la* Topsy. 24.2% (Average) say that they are due to seed. In a college freshman class 32% of the women to 10% of the men believe that weeds just grow.

This wide spread belief reminds one of the parable of the seed growing unobserved. (Mark 4:26–27). "This is what the Kingdom of God is like—like a man who has scattered seed on the ground and then sleeps by night and rises by day, while the seed is shooting up and growing—he knows not how." The following sentences show how the same parable is expressed to day. The disconcerting thing about these statements is that the authors think that they are giving real reasons. We can no longer be content with such statements, as—"Come there." "Grow there by nature." "Weeds have a natural tendency to grow." "The seed was probably near a stone or bad soil." "Unhealthy land." "Just grow from poor part of soil." "Grow over night." "Grow from fertilizer." "Naturally grow from the ground." "Natural growth of earth." "From lack of attention." "By lazy people not hoeing their gardens." "Weeds being wild grow anywhere." "Seeds of weeds are always present." Such statements show that we may have spontaneous generations in the mind as well as physical spontaneous generation. The latter has been disproved but belief in it, though often subconscious, is still rampant. It is of paramount importance that education do away with the superstition that permeates our intellectual processes. Nature-study, gardening, and general science contribute a great offset to this mental obstruction.

What Shape is the Heart?

The heart is not heart-shaped. Heart-shaped refers to the conventional form seen on valentines, jewelry, and playing cards.

In the same way the botanist calls certain leaves heart-shaped or cordate. The heart is sometimes spoken of as pear-shaped.

Other early notions referring to the heart have been passed on by certain words and expressions, such as—sweetheart, heart-breaker, hard-hearted, hearty, heartless, and heart-strings.

It may be surprising to know that many people think of the heart as cordate. This is true of 21% of those examined in an agricultural college; junior high school, 21%; high school freshmen 39%; high school seniors 35%; normal school freshmen 45%. The latter are our future teachers. They no doubt will learn much about the shape of the heart in physiology and it is to be hoped that they at least will not pass on the mistaken ideas.

Is the Fear of Snakes "Inborn" or due to Education?

Snakes have played an important part in the delirium tremens of literature. With a scriptural foundation aided by the old time immunity of Ireland the fear of snakes is exhibited at a very early age. Amongst college and normal school students 38% believe this fear is due to being inborn; 33% believe it is the result of education or attitude of adults; and 6% say that it is due to both. There exists an undoubted gullibility as to the evil doings of snakes. From this belief it is very easy to manufacture a fable as the hoop snake which is supposed to take its tail in its mouth and roll like a hoop. Superstition and fear is a tax on intelligence. We should in no way more especially by that of awe—subjugate the reasoning powers. Dickens once said, "What a beautiful thing human nature may be made to be." He might have said in this connection: What a fearful thing human nature may be made to be.

A little investigation indicates that the fear of snakes is due to the attitude of parents, teachers, and other associates of the child. Professor John B. Watson of Johns Hopkins University has carried on some experiments to test out the truth of the older statements which maintain that violent emotions appear at the child's first sight of animals. His results are published in "Kindergarten and First Grade" for January, 1920. He concludes that babies have fear but that there are few positive results in the reaction of children to their first sight of animals. I once took a baby rat and a garter snake into the first grade. The children were told that one of the animals was warm and the other cold.

They were then asked if any one would like to pat them to see which was warm and which cold. There was a stampede to the front. I then realized that I had not had the courage of my convictions. The children were then asked to take their seats and told that each one would be given an opportunity to pat the rat and the snake. They all did this without the least sign of fear. It may be claimed that this too was due to education i. e. the expression of the teachers face, manner of handling the reptile, etc. If this be true, which kind of education do we want? The kind that handicaps clear thought or the kind that takes things on their face value? If there are no legitimate reasons for fearing snakes why make the assumption.

What Danger is There in Picking up an Adder?

There is a legend that once the Python was the only poisonous snake. It could sting a footprint and the poison would kill the man. One day a Crow told the Python that a man had not been killed. The Python then climbed a tree and spat out all its poison which was swallowed by the smaller snakes. Possibly on no less a foundation rests the assumption that all snakes are poisonous.

The word snake does not occur in the scriptures. The term adder is given to several venomous serpents and sometimes to the Horned Viper (Cerastes). Ps. lviii 4. "They are like the deaf adder that stoppeth her ears." This may have given origin to the old saying "Deaf as an Adder." Pro. 23. 32. "At the last it.....stingeth like an adder." From this may have arisen the idea that adders sting. Adders are not deaf and neither do they sting. Behold their wondrous colors. Their colors are beautiful and blend and the lilies of the field do not have patterns like one of these. Yet man in all his studies of harmony does not admire them.

The danger in picking up an adder, as expressed in school, are hereby given:

	Poison	Sting	Bite	None
College and Normal School.....	16%	12%	12%	8%
High School.....	28%	14%	31%	2%

The data indicates that these erroneous ideas are later corrected, to a slight extent, but not as much as one might wish. The mistake comes in allowing them to originate.

All adders of North America are harmless. (The only poisonous British reptile is the common adder of Europe, Vipera berus). The Puffing Adder is protected by his "puffing." The Milk Adder or Milk Snake searches around barns and old cellars for rats and mice thereby performing friendly acts for the farmer. The name of this snake comes from a reputation of stealing milk. Ditmars writes that he cannot be induced to drink milk unless suffering from great thirst and goes on to mention that if the snake should drink its full it could not consume more than two teaspoonfuls. Snake facts and snake fancies are therefore quite remote.

Scientists believe that man descended from.....? (Supply the missing word).

No scientist believes that man descended from Monkey. 58% of the students in college and normal school nevertheless think that such is the case. What many scientists do think is that Man and Monkey probably came from a common ancestry. Zoologically they belong to the same group. From a structural point of view man differs less from the apes than they do from other monkeys.

Scientists believe that animals originated from.....?

Scientists do not believe that animals descended from plants. They are supposed to have come from a common ancestry. There are organisms which cannot be classified as either plants or animals.

Rabbits should be lifted by the.....?

There is no more logic in thinking that a rabbit should be lifted by the ears than that a cat should be lifted by the tail or a baby by one leg. The tail of a cat is a convenient handle for lifting her but she has taught us that it is not good form. The rabbit has suffered by not having such an effective means of communication.

The existing notions may be classified as follows:

	Ears	Feet	Neck	Body
College and Normal School	56%	4%	12%	3%
High School	85%	4%	3%	1%
College Freshmen, male	78%	4%	2%	0
College Freshmen, female	54%	4%	16%	2%
High School, male	94%	3%	0	0
High School, female	73%	10%	0	0

The following conclusions may be drawn from the above table: The majority of people believe that rabbits should be lifted by the ears. (The function of the ears is to hear). This belief is

more prevalent amongst boys and men than with girls and women. It is exceptional to think of lifting the rabbit by the body. This, however, is the most humane method of picking up the animal.

What is the Name of the Fourlegged Animal with Bright Spots Which is Found Under Logs and Stones in Damp Woods?

This animal is the Salamander and not the Lizard which it resembles only in external form. The Salamander is an amphibian and the Lizard is a reptile.

	Lizard	Salamander
College and Normal School	21%	9.5%
High School	57%	8%
College Freshmen, male	42%	24%
College Freshmen, female	38%	4%

The results indicate the marked existence of the erroneous idea that the animal is a Lizard. The term Salamander is more widely known amongst the men.

The name Salamander is a synonym for fire-proof. The ancient naturalists (or fabulists) Pliny and Aristotle maintained that the salamander was incombustible. This fire-proof fame has come down through the ages being applied to various utensils used around the fire.

Give a Sentence Using the Correct Pronoun (*it, she, or he*) on Referring to Nature

The expressions mother earth, mother nature, mother west-wind and the like have led to the misconception that "nature" is "she." Some have come to think of nature always as "mother nature." This personification is liable to lead to what "mother nature" tells her children and then to talking-ducks and weeping Lady-Bird Beetles, and so on, ad infinitum. "Mother nature" is not a mother, as we wish to know mothers. The oyster is said to have 1/1,145,000 of a chance of living. This is not the act of a mother but a "cold blooded" means of perpetuation. The vase-shaped egg-sac of one of the spiders contains several hundred eggs. These eggs hatch and most of the little spiders are eaten by the stronger members of the family. Only a few young spiders emerge in the spring. We must either change our views of the spirit of a mother or acknowledge that "mother nature" exists entirely in the imagination.

What Causes Autumn Colors?

The autumn colors are due to the breaking up of the chlorophyll which gives different species of trees their peculiar colors. The brightest colors are produced in swamps where it is cool and moist before the frost occurs. A frost turns leaves brown and not into bright colors.

	Nature	Frost	Weather	Sun	Season	Sap
College and Normal School	2%	17%	4%	2%	1%	3%
High School	8%	29%	11%	6%	1%	2%

The majority believe that autumn colors are due to frost. Weather and season answers are probably hazy notions of the same idea. To answer this question by saying it is nature is begging the question. All questions pertaining to nature could be answered this way.

Why Are Leaves Placed Around Shrubs for the Winter?

This common practice amongst horticulturists is to keep the frost *in* and not *out* as is commonly thought. The mulch prevents a sudden freezing and thawing. The reasons given with average % were: Warmth, 21%; frost, 37%; protection, 15%; fertilizer, 8%.

Would you Eat Butter or Drink Milk that had Chemicals in it?

	No	Depends	Yes
College and Normal School	21%	9.0%	30%
High School	49%	0.5%	17%

In thinking of chemicals we are too apt to have a vision of laboratories, bottles, and labels. If our perspective stops there we do not have the broad outlook that chemistry should give us. We see symbols and not ideas. The symbol is only a means to an end. Our educational courses should not stop with the means of seeing, these tools should be made to reproduce ideas.

Have Some Friend Give You the Following Spelling Test.

Potato, radish, pole beans, larva (of an insect), harelip, plantain, dandelion, mullein, caterpillar, development, definite, occurrence, pistil (of a flower), develop, squirrel, nasturtium, moss, diphtheria, desiccate, paraffin, inoculate, tonsillitis, singular of species, leaves, seedsmen, and bacteria.

This list of biological terms is a collection of words which are most frequently misspelled. Although many well-educated people are poor spellers the correct spelling of these words may indicate the amount of Biology one has had. In the case of radish, however, the lowest per cent of correct spelling was 45% made by high school graduates who had had Botany. The misspelling in this instance may have been an index to the kind of Botany they had had in high school.

The singular of species is most often misspelled. It should be specie. The highest average was 26% made by the freshmen of a woman's college. The word specie was the incorrect form most commonly used. One scientist has said that specie is something that a biologist never has. The difficulty may be easily removed in other cases by knowing the meaning of the word as in the case of harelip, pronunciation as in develop, or the origin as dandelion from dent-de-lion. Such words as occurrence may be made indelible by calling attention to the two r's. The second most difficult word is mullein. Six per cent of the men in the freshmen class of a noted university were able to spell the word correctly. The Winston Simplified Dictionary gives mullen as a possibility but this book was not published until 1919 and it is doubtful if any of these men obtained their modern method of spelling from this source.

The relations according to sex are of interest. The boys from a ninth grade headed the list in spelling *development* correctly with an average of 84%. The girls from the same school had an average of 63% but when it came to the word occurrence the girls headed the whole list with 84% correct and the boys of the school had but 56% correct. The girls from two junior high schools obtained the higher per cent in 11 cases and the boys in 10 cases. The difference is more marked when we come to the freshmen in college where the girls win in 15 cases and the boys in 6 cases. Three of these words, where the men averaged higher were in the list won by the boys in the grades. In general, as expected, the spelling efficiency increases with age and grade.

This list of words is not intended for a school spelling lesson. They should be added to the pupils' vocabulary when occasion arises for their use. As they are words which are misspelled over and over again the teacher should make sure that they are mastered. Since most of these words are commonly used by children in the grades they should be effectively dealt with at that time.

In passing, a story may not be amiss. A tailor wished to order 12 smoothing irons or gooses. He did not know whether to write 12 tailor's gooses or geese. He finally ordered one tailor's goose and eleven more like the first order. The moral is clear. In times of doubt use "ready-made" words to suit the occasion.

PRONOUNCE THE FOLLOWING WORDS:

abdomen	ab-do′-men	not ab′-do-men
acorn (Anglo-Saxon meaning field or acre)		ā -kern
alimentary	al′ and not el′	
almond	ä′mŭnd	
ant	ánt	not änt
asparagus	ăs-păr′ -ā-gŭs	not sparrow-grass
biology	bī-ŏl′ō-ji	not bĭ
cerebrum	sĕr′ ē	not sē-rē′
chestnut	ches′	not chest′ nut
cranberry	kran′ beri	not kram
fungi	fun′ ji	not fung′-gi
hoof	hōōf	not hŏof
horseradish	hôrs-râdĭsh	not rĕd-dĭsh
insect	in′-sĕkt	not in′-sĕk
intestine	in-tes-tĭn	not tīn
isolated	either ī′ or ĭs′	
laboratory	lăb′-ō-rā-tō-rĭ	not lăb′ -rā-tō-rĭ
lettuce	lĕt′ -ĭs	not lĕt′ ŭs
loam	lōm	not lōōm
mackerel	mak′-er-el	not mak′ rel
muskrat	musk′ rat	not mush′ rat
poplar	pop′ lar	not pop′ u lar
porpoise	por′-pus	not por′ poise
pumpkin	pump′ kin	not punī kin
root	rōōt	not rŏot
spiracle	spĭr′ or spī	
squirrel	skwŭr′ ĕl	
stomach	stum′ uk	
sumac also h	sŭ′ mak or shōō′ mak	
teat	tēt	
tomato	mā to or mä to	not to-măt-o
turnip	tûr′ nĭp	not turnup
zoology	zō-ŏl	not zōō-ŏl

A Providence lady once asked her gardener to plant salivias near the walk. The gardener replied: Wouldn't spetunias look good over there?

What is a Germ?

The etymology of the word germ is doubtful. The Latin word *germen* means to sprout. In botany it refers to the rudiment of a new organism. Huxley referred to the budding of corals, as multiplying "by means of germs." In Linnaean nomenclature it is the ovary or the seed. Muir and Ritchie's Bacteriology says "germ, microbe, and micro-organism are often used as synonyms with bacteria, though, strictly, they include the smallest organisms of the animal kingdon." Evidently there is ambiguity in the use of the term amongst biologists.

The answers of pupils may be listed as follows; the figure representing the highest per cent in any one class thinking that that word is the meaning: Organism, 6; micro-organism, 36; micro-animal, 14; micro-insect, 28; and bacteria, 70. The term *organism* is not used as often as a generation ago yet it ought not to be confused with micro-organism which refers to a microscopic animal or plant. Organism has come to be an abbreviated form of micro-organism.

What is a Meadow?

Originally a meadow meant a hay field. Later it included a pasture and in some places was extended to include a low well-watered ground. In North America, according to the Oxford Dictionary, it is "a low level tract of uncultivated grass land, especially along a river or in marshy regions near the sea." If we condense this statement it might read,—a low, level, moist grass land. The word meadow has been prefixed to the names of animals and plants which occupy the meadow land, as meadow hen (name applied to various herons); meadow-lark; meadow-sweet (spiraea); meadow beauty (rhexia or deer-grass). The word meadow occurs frequently in literature but without uniformity as to meaning.

Amongst students of today there are 80% who recognize that it is a hay-field. It is a decidedly masculine trait to know that it is in a low area, the knowledge being held in a ration of 4 males to one female. Not more than 12% of any class, and only a total of 18 recognize that it is a low, hayfield.

The geographical distribution of the various meanings of the term would make an interesting study. "Up from the meadows all filled with corn" suggests another departure.

What is Dirt?

Primarily dirt means excrement, secondarily filth, and only colloquially soil. The answers were in the following proportions: soil, 141; filth, 64; soil and filth, 5; matter out of place, 7. The majority have the false impression that soil is dirt. Soil may be perfectly clean, as sand, which is used for filtering. In preparing the garden we are tilling the soil.

What is a Biennial?

Biennial (bi-two, annua, year), existing for two years. In botany a biennial plant vegetates during the growing season of the first year and dies after producing fruit the next year. Amongst the freshman class entering college or normal schools many answered that a biennial means twice a year (33%) as answered that it means two years.

How Long Does an Annual Plant Live?

An average of 59% said one year and an average of 16% said less than a year. The highest number of correct answers were made by the boys in a junior high school (28%), and freshmen in a normal school that have had botany (27%); high school freshmen (29%); high school seniors (28%). The figures of the higher institutions would indicate that as education continues the concept of the length of life of an annual plant diminishes. It still remains a masculine trait, 20% of the men in the freshman class to 12% of the women saying that an annual plant lives less than a year.

What is a Flower?

The following are typical answers:

1. A stationary living creature.
2. A thing growing out of the earth to beautify it.
3. A plant with colored variations.
4. A plant grown to admire and not to eat.
5. The petaled flourish of a plant.
6. The blossom of a plant.
7. That which later bears fruit.

Over one-third of the pupils in our schools when using the term "flower" are thinking of a "a flowering plant." Such plants are ordinarily grown for their blossoms. The first four answers show such a use. Early English writers made a similar use. Shakespeare, 1593, in Lucrece (p. 870) mentioned that "unwholesome weeds take root with precious flowers" and Milton in Paradise Lost (XI, p. 273) wrote, "O flours that never will in other climate grow." In a popular way when we mention flowers we think of the colored (not green) parts and do not say flower when the petals are absent as in the pussy willow. A corolla and calyx are not necessary. Botanically we should think of the flower as a means for reproduction. The children should be taught that garden vegetables, weeds, and grass are flowering plants. They should think of the flower as a "seed-maker" and not as an ornament just meant for us.

Where do Plants Occur?

Plants do not merely sprout from the ground. They may be found in the ocean breakers, on the backs of shell-fish, in clear ponds and on rocky cliffs, on the roofs of all houses and in every room below, on the leaves of trees and on their roots in the ground.

Use the Words Sitting, Setting, Laying and Lying in Reference to a Hen.

Many will no doubt sympathize with the farmer who told the Boston School teacher that he didn't give a darn whether the hen was sitting or setting but when she cackled he wanted to know whether she was laying or lying. To set means to cause to sit. It is correct to say that he is setting the sitting hen on a sitting of eggs. Setting hen or a setting of eggs is incorrect. There is such an animal as a setting dog. To lay means to cause to lie. Hens lay eggs.

What is an Animal?

The meaning of the word animal has had rather a checkered career. Bishop Gawin Gouglas in his translation of Virgil's Aeneid (1513) wrote "Undyr animal beyn contenyt all mankynd, beist, byrd, fowel, fisch, serpent, and all other sik thingis." The word itself originates from the Latin meaning breath of life or anything living. It was hardly in the English before the end of the 16th Century. It was not used in the Bible in 1611. In 1875, Helps, Animals and Masters (iii, 53) says that "When I

use the word 'animals' I mean all living creatures except men and women." In New York, October 18, 1911 a sea captain was brought into court for piercing the flippers of large green turtles in order to tie them. The magistrate held the captain in $500 bail on the basis that within the law the turtle is an animal although without the law it is a reptile. The same kind of a case had failed in 1867. On the 1920 calendar of the Rhode Island Humane Education Society are the following sentences: "The object of the Bands of Mercy is to teach children to be kind to each other and to all who need help and protection, as well as to animals." "The child who respects the rights of animals will also respect the rights of human beings." Amongst the uneducated the fur bearing quadrupeds only are considered as animals. These various meanings of the word have led to a mixture of ideas in the schools.

The opinions of college freshmen as to various animals are hereby summarized:

The woodchuck is a mammal. 1. *Woodchuck.*—40% females to 10% males think it is not an animal. 34% females to 12% males think that it is a bird. This is probably a confusion with the woodcock which is a bird. This also indicates that girls think that a bird is not an animal.

2. *Man*—Man is an animal, belonging to the class mammals. 32% of the females to 2% of the males think that man is not an animal. This is further proved by the fact that 12% of the males to 6% of the females correct the statement "Man and animals eat food" to "Man and other animals eat food." 18 out of 281 examined recognized that man is an animal. It is also used in this sense in statute books in reference to the prevention of the cruelty to animals as "man and animals."

3. *Whale*—The whale is not a fish. It is a mammal. 36% females to 68% males think that the whale is an animal. 62% females to 38% males think that the whale is a fish. The males in every case tested seem to have a more accurate and broader view as to what is an animal.

4. The *perch* is an animal belonging to the class fish. 16% females to 42% males think that the perch is an animal. 78% females to 94% males think that the perch is a fish.

5. The *bat* is a mammal and not a bird. 38% females to 62% males think that the bat is an animal. 36% females to 42% males think it is a bird. Every thing that flies is not a bird.

Fossils show that there used to be flying reptiles. There are so called flying fish, flying squirrels, and a flying lemur. Angels are also credited with the art of flying. The latter are the only animals, not birds, represented as having feathers.

6. The *heron* is a bird. 26% females to 50% males recognize this. 30% females to 16% males believe it is a fish. This probably comes from a confusion with the herring which is a fish.

7. The *turtle* is a reptile. It is a relative of snakes and lizards. 28% females to 48% males recognize that it is an animal. Only 42% males to 10% females recognize that it is a reptile.

8. The *perch* is a fish. 78% females to 94% males say that it is a fish but only 16% females to 49% males think that it is an animal.

9. The other examples may be tabulated:

	Plant		Animal		Insect		Fish		Amphibian		Reptile		Bird	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Tadpole.....			44	22			32	16	40	38				
Spider.....			12	2	86	92					26	32		
Katydid.....12		0	22	12	48	40					16	4	26	40
Coral.....10		16	20	12	2	2	18	14	14	14				
Clam.....			34	22			34	54	6	6				
Sponge..... 8		14	24	8			12	10	12	8				
Bacteria..... 18		18	20	8	18	20								

What is Meant by Ugly?

A study of the idea ugly in literature will give a basis for understanding the present day feelings.

1300–1400, Cursus, Mediaeval and Vulgar Latin (Gott), "Fell dragons and tadis bath....ful laithsum on to here and se...

1666, Bunyan, Grace, Abounding to the Chief of Sinners (p. 84), "I was more loathsome in my own Eyes than was a Toad."

1667, Milton, Paradise Lost, (XII, 178), "Frogs, Lice, and Flies, must all his palace fill with loath'd intrusion."

1600, Shakespeare, As You Like It (ii I. 12–14),

> "Sweet are the uses of adversity,
> Which, like the toad, ugly and venomous,
> Wears yet a precious jewel in his head."

The fable of the jewel in the toad's head is probably based on the glistening cartilage which represents an unossified basioccipital.

1611, The Bible, Exod. 8, 2, "I will smite all thy borders with frogs" Rev. 16, 13. "Frogs (come) out of the mouth of dragons."

The following terms are used in the bible in reference to the serpent: subtile, beguiled, fiery, brasen, cooked, poison, biteth piercing, and wise.

1748, Thomson, Castle of Indolence, (543), "In chamber brooding like a loathly toad."

1886, Besant, Children of Gibson, II, vi, "A knight was sent forth to kill a dragon or a loathly worm."

Animals have borne the burden of false misrepresentations down through the ages. It is not surprising that the toad gets the highest vote as to ugliness, 60% giving him that characteristic. The other ugly animals were as follows: Bat (58%), earthworm (54%), fly (51%), snake (51%), ant (47%), and eggs of clothes moth (42%). 16% of the females in a college freshman class think that the cow is ugly. It is a male trait to think that the dragonfly and the silkworm is ugly. Ugliness seems to be a matter of enchantment or prejudice. All these traditions have been interwoven with modern progress. The heavy tax levied by superstition on intelligence is well known to scientists.

What Animlas are Injurious?

56% of all the pupils examined believe that the snake is injurious; 27% the dragonfly; 26% the bat; 14% the earthworm; and 28% the crow. It is a female trait to think the bat and eggs of the clothes moth are injurious. Of course the eggs are harmless. The larvae that hatch from the eggs do the damage. It is a male characteristic to think that the dragonfly and crow are injurious. The value of these animals as insect destroyers is now becoming generally recognized. It must be admitted however that the process is slow and the only remedy is progressive work in the grades to prevent the confounding of fancy with fact.

What is Cross-pollination?

Cross-pollination is the transfer of pollen such as by the wind or by insects from one flower to the stigma of another. Cross-pollination is not cross-fertilization. Cross-fertilization is the union of the male and female elements. Cross-pollination makes cross-fertilization possible.

Epilogue: In the beginning of this article I suggested that too much seems to centre on the reputation of the buried past and not on direct observation of the living present. Antiques from tradition-shops are still coddled by sentimentalists. These

musty relics are handed down from generation to generation thereby cheating would-be workers with their false value. My task is finished if I have been able to show, at least to some extent, that whatsoever is most exact and regular concerning nature is also most useful and excellent.

A Necrology of Nature-Lovers

ANNA B. COMSTOCK

During the past months of 1922, there have gone from our midst several who belong essentially to the realm of nature-study. They were not great scientists in the sense of being specialists but two of them were Naturalists of a high order, one a poet, one a teacher. In their going, the living world has lost loving interpreters and we mourn our loss of their inspiring companionship.

Enos Mills

Enos Mills was to the Rocky Mountains what John Burroughs was to the East and John Muir to the Sierras,—a careful observer and a sympathetic interpreter of nature in all its forms and phases; he was a firm believer in the conservation of natural scenery and wild life. He was born in Kansas City, Kansas, April 22, 1870. As a lad, he was not strong and his schooling was by no means regular or consecutive. At the age of 16 he was so delicate that, fearing tuberculosis, he went to Long's Peak, Estes Park, Colorado and lived there in a cabin. It was a lonely place in those days for a boy, since he had no companions for the greater part of the year. He soon found companionship with Mother Nature, and she served him well; he grew in health and strength until his prowess as a mountain climber became known the world over; he climbed Long's Peak more than 250 times; he explored vast areas alone, on foot and without a gun. It was inevitable that he should find self-expression in writing. He wrote The Story of Estes Park, in 1905 and later the following volumes: Wild Life in the Rockies; The Spell of the Rockies; In Beaver World; The Story of a Thousand Year Pine; Rocky Mountain Wonderland; The Story of Scotch; Your National Parks; The Grizzly, Our Greatest Wild Animal; The Adventures of a Nature Guide.

He was appointed snow observer for the Federal Government in 1907 and for many years past he has added to the scientific data collected through many sources concerning the Rocky Mountains. He gave many addresses and wrote many articles urging protection to the birds, wild animals, flowers, trees and scenery of this country, especially of the Rockies. He earned well the title "the Father of The Rocky Mountain National Park." His most recent and interesting enterprise was the promoting of the use of Nature guides in all of our National Parks. We have had several letters from him expressing his views concerning this important movement. Mr. Mills did not marry until he was forty-eight; then he found a congenial companion in the person of Esther A. Burnell. His death came as a shock to all nature lovers many of whom like ourselves had long anticipated visiting Long's Peak and meeting the man who had made us love the mountain although we had never seen it.

W. H. Hudson

To those of us who have reveled in that remarkable work, The Birds of LaPlata, or who have come to love Patagonia through Idle Days, the news of W. H. Hudson's death seemed a catastrophe. This great naturalist has been known to the public only through his books for he was so retiring and reserved that he never gave lectures or became known personally to his large circle of admirers. Since his death we have a record of one of his friends, Mr. Richard Curle who has given us interesting side-lights upon his character. Mr. Hudson was essentially isolated in his relation to Nature, for he seemed never to wish the companionship of even his nearest friends on his walks or journeyings in the wilds. He seemed to have no relatives and just a few choice friends among the cultivated people, and these found him interesting and lovable. When at home in England, he was in the habit of taking luncheon once a week at the Mt. Blanc Restaurant with a few close friends among whom were the novelists Joseph Conrad and Percival Gibbon. These found him attractive though somewhat eccentric. Curle says "One was always aware of a reserve that nothing could pierce, a reserve embedded in the very construction of his mind and founded upon a solitary and elf-like quality of his inner nature." Curle also says "Books satisfied the mere rim of his nature and his soul sickened and pined if long absent from its

solitude." He so loved the beauty of the world, and was so intimate with the secrets of Nature that, though more than eighty when he died, he dreaded death and he could not bear the thought of being separated from the scenes, the wild creatures, the trees, and the flowers that he loved. He said "If I could count on another fifty years or one hundred, I should be happy." He did not write easily, but his style was admirable, his English perfect and he knew how to fasten and hold the interest of his readers. He never took pride in authorship; when a book was printed, he turned his back upon it, for it had no more interest for him. Although he was to his friends a man of mystery never caring to speak of himself, yet in that remarkable book "Far Away and Long Ago" he gives the world complete self-revelation in the autobiography of his childhood. In this story of a child born and reared on a plantation in Argentina we find constant evidences of his intense love of the beautiful in nature; and we trust that although he has been taken from the world he loved, he has found another world as beautiful and full of interesting life which shall be his for eternity.

Irene Hardy

Irene Hardy was not a naturalist, but she was a careful observer and gave sympathetic understanding to her environment in the natural world. She was born in Ohio in 1841 and grew up with that reverence for education which characterized the American people of her day. She gained her early education in common schools and later was a student at Antioch College which in those days was as much of an innovation in the way of colleges as it is today under its recent recrudescence. Later Miss Hardy went to the Pacific Coast, and as a teacher of English in the Oakland High School, she won for herself an enviable reputation; incidentally she studied with Edward Rowland Sill who was Professor of English at the University of California.

Soon after Stanford University was established, she was called to that institution as a member of the staff of the Department of English; and those who were fortunate enough to receive their training in her classes have given her the highest tribute that a teacher may receive.

Miss Hardy had the eyes of an artist and quite uninstructed, she made admirable sketches of the scenes which she loved. A

sepia sketch of San Francisco from the Oakland marshes which she made is a much prized possession of the writer. However, poetry was her chief means of self expression; fortunate it was that she relied upon her pen instead of her brush to give her impressions to the world because her eyes began to fail, and in 1901 she retired from teaching, and finally became entirely blind. She bore this affliction with a bravery that none of us can forget who witnessed it. As her physical eyes closed on the beauty of this world, her spiritual eyes found new beauty in the realms unseen. She continued to write and much of her verse still had for its theme the birds and the flowers and the fields and the woods which she had so loved. Her poems were published in a volume in 1902; unfortunately most of this edition was destroyed in the fire in San Francisco which followed the earthquake. Those of us fortunate enough to possess this volume hold it among our precious treasures. Although she was never very strong, she was able through a wise husbanding of her strength to accomplish a great amount of work. She was naturally reserved and comparatively few had the privilege of knowing her intimately; those to whom this privilege was vouchsafed, have prized it as one of the great experiences of life. Her mind was as keen and her soul as sensitive to the beautiful when she passed on at the age of eighty-one as in the days of her prime, and much of her best verse was written during the last decade. We append here one of her later poems since it expresses so perfectly her attitude toward life and death.

Praise

IRENE HARDY

Were I of other than the human race
Then I would be a bird, if I might choose,
A brown-winged thrush, with voice of note profuse,
The line of beauty audible by grace
Mysterious, in some far-sequestered place;
There I would sing as one whose soul pursues
A heavenly theme its very self to lose
In ecstasy before the Master's face.

Enough, if so I make my life complete,
One perfect rounded whole of love and praise,
If He again should take who gave my song
Because He finds its adoration sweet;
It is enough if in its faintest phrase
He finds no sound or accent wrong.

W. J. Stevens, An Appreciation

L. M. Dougan

Principal Eugene Field School, St. Louis, Mo.

With the falling of the leaves, his resistance gave way, and, on October eighth, death came quietly to one of our beloved leaders, Ass't. Supt. W. J. Stevens of the St. Louis public schools. From the beginning of his service with us in 1901, he was a leader in the promotion of nature-study, school gardens, and tree planting. He was president of our St. Louis Section, in 1912 and 1914, one of its moving spirits from the date of its organization, and a member of the council of the National Society in 1918–1920.

There is scarcely an excursion-route which we have developed that is not fraught with pleasant memories of his helpfulness and companionship. He had botanized with us in the Ozark hills, when the red bud and the flowering dogwood were re-coloring the still leafless woods with the first touches of spring. He had cracked secrets out of the rocks for us with a geologist's hammer. With us he had drawn inspiration from the rising of the sun over the Mississippi and the scintillation of the stars so suggestive of infinite power and perfect harmony. With us he had reconstructed the ancient history of some of our inland lakes and speculated on the hoary past of our Indian mounds at Cahokia. One memorable Christmas vacation he spent with us near Mobile, Ala., making new friends among the southern plants and gathering new energy from the ocean breezes. In each case his winsome personality added a delightful human touch to nature.

All phenomena interested him, but he was primarily a geographer. As such he was largely concerned with the interpretation of the earth as a home for human folks; and, in pursuit of this aim, he did notable work in enriching the teaching of geography throughout our city. With the help of the children, he created two school gardens, one for vegetables and one for flowers, on a vacant lot adjoining the Engene Field school of which he was for fifteen years the principal. These gardens, in spite of the increasing noise and congestion of traffic on the adjacent streets, still attract attention, and refresh the eyes of passing citizens—a fitting testimonial of Mr. Stevens' interest in Nature and children.

Our favorite walks shall know his form no more. The earth he loved to study has claimed its own. But each spring as we go forth to witness the drama of the triumph of plant life over the forces of decay, his buoyant spirit will still be with us strengthening our faith in the possibilities of Man and Nature.

Program for the Seventeenth Annual Meeting of the American Nature-Study Society

President, WILLIAM G. VINAL, Rhode Island College of Education, Providence, R. I.
Secretary, MRS. ANNA B. COMSTOCK, 123 Roberts Place, Ithaca, N. Y.

Preliminary Announcement:

PROGRAM OF ANNUAL MEETING, BOSTON, MASSACHUSETTS, DECEMBER 28–30, 1922.

APPLIED NATURE-STUDY

Thursday Session, December 28, 10:00 A. M., Massachusetts Institute Technology.

1. Nature-Study of the Various Scouting Organizations.
   E. Laurence Palmer, Professor of Rural Education, Cornell University. Editor Cornell Rural School Leaflet.
2. Some projects in the Princeton, New Jersey Schools. A day at the Walker Gorden Dairy. A day on a Farm. A School Fair. A Yard Garden.
   Annie T. Washburn, Supervisor of Nature-Study, Princeton Public Schools, Princeton, N. J.

"Get Together in Nature Education."
Van Evrie Kilpatrick, Director of School Gardens, New York City. Mr. Kilpatrick is Chairman of a Committee making an inquiry into the state of Nature Education conducted by the Bureau of Education. To date, 717 cities have replied. Material for a report of far reaching importance has been collected.

"Nature Work with Younger Children: In the Home and School."
Mrs. Helen H. Neal. Mrs. Neal and Professor Neal (Professor of Biology at Tufts College) have definite ideas as to Nature study in the home. Mrs. Neal has been director of Nature-lore in the Luther Gulick Camps. What she has to say will be of great interest to teachers.

Dinner of the American Nature-Study Society,

This dinner will be in honor of Anna Botsford Comstock, who is retiring as Professor of Nature-Study at Cornell University. An invitation is extended to all persons interested, whether members of the society or not. Tickets may be purchased of the President or at the Thursday morning meeting of the Association. Toastmaster, Clarence Weed, Principal State Normal School, Lowell, Massachusetts. Following the dinner there will be short talks.

The dinner will be at Hotel Bellevue, Beacon Street near the State House. $2.50 per plate. Reservations cannot be made later than 12:00 o'clock, Thursday, December 28.

Friday Session, December 29, 10:00 A. M., Massachusetts Institute, Technology.

Applied Nature-Study. New England Day.

1. Nature-Study; Then and Now.
   Arthur C. Boyden, Principal State Norman School, Bridgewater, Mass.

Another Normal School principal who once taught Nature-Study. Author of Nature-Study by Months. Bridgewater Normal with its Greenhouse, Tree Nursery, and Botanic Garden is a good example of applied Nature-Study.

2. Project: Feeding the Heron, leading into the collection and study of fishes, insects, etc. All classes in a country school.

Miss Fannie A. Stebbins, Supervisor of Nature-Study, Springfield, Massachusetts. The School carrying this project is known as the "Bird Hospital." Whenever school children find an injured bird they send it to the "Bird Hospital" for repairs.

"Nature Hobbies and Hobbyists."

Dr. Marion Weston, Nature-Study Department of the Rhode Island College of Education. Dr. Weston, as President of the Rhode Island Field Naturalists' Club had pronounced success in getting people interested in a Nature Hobby. Her talk will be full of suggestions as to how we can carry on the good work. Every Nature Leader should start such an organization in his own bailiwick.

3. The Uses of Bulbs in the Schoolroom.

Charles M. Lamprey, Director of the Model School; Boston Normal School. Mr. Lamprey distributes each year about 20,000 bulbs to the teachers and children in the city of Boston approximately at cost.

4. The Need for Gardening as an Intermediate Grade Subject in City Schools.

Miss Breta W. Childs, Teacher of Nature-Study at the State Normal School, Worcester, Massachusetts.

5. The Possibilities of Nature-Study in English Composition.

Miss Pearl McCoy, Teacher of Nature-Study at the State Normal School, Bridgewater, Massachusetts.

6. Adequate Use of the Aquarium and Terrarium.

Charles S. Preble, Teacher of Nature-Study at the State Normal School, Farmington, Maine.

7. Nature-Study as a means of Education for Leisure.

Miss Gertrude B. Goldsmith, Teacher of Nature-Study at the State Normal School, Salem, Massachusetts. Business Meeting. Election of Officers. Report Secretary-editor.

Saturday Session, December 30, 10:00 A. M., Museum of Comparative Zoology Harvard University, Cambridge, Massachusetts.

1. "Personal Reminiscences of Professor Louis Agassiz." 30 minutes. Mr. J. Henry Blake, An associate of Professor Louis Agassiz.

2. Visiting the Glass Flowers and other exhibits of interest.

Afternoon Session, 2 P. M.

1. Arnold Arboretum of Harvard University, Jamaica Plain, Mass. Welcome and conducted tour through the Arboretum, probably by Professor John G. Jack.

THE
NATURE-STUDY REVIEW

DEVOTED PRIMARILY TO ALL SCIENTIFIC STUDIES OF NATURE
IN ELEMENTARY SCHOOLS

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Editorial

The Falling Leaf

The old, black cherry tree which poses artistically four seasons of the year in front of the Editor's window keeps her leaves green until after all other trees except the oaks stand bare; then she changes her colors gradually to an orange film over glowing yellow until one day in November the climax of her beauty is reached, and she stands arrayed in gorgeous draperies, the peer of an Oriental Princess; this lasts but a day, then the leaves begin to fall; with every breeze they come shimmering down to lay a Persian carpet at her feet; one day later she stands demure and unadorned as if she had taken orders and like a nun had turned her back upon the pomp and vanities of the world.

What of the leaves! They sail down so happily, they play with the wind until they find resting places in corners and in windrows there to stay until through the kindly alchemy of Nature's Laboratory they give up their component elements and thus, through transmutation, gain the immortality decreed to all physical death. Death to the leaf is merely a new start toward other activities. New activity, wider realms and new energies for action,—this is what Chemistry teaches us is the result of death of our physical bodies.

What an opportunity the Nature-Study teacher has to save the child from the horror of death; for death in a child's mind has to do with the body alone. W. H. Hudson in his charming volume of childhood reminiscence tells vividly of his feeling when at the age of six he witnessed the burial of their pet dog, old Caesar. And when he listened to the words of the schoolmaster "That's the end. Every dog has his day and so has every man, and the end is same for both. We die like old Caesar, and are put into the ground and have the earth shoveled over us:" Hudson

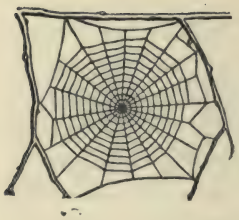
says that "How these simple, common words affected me more than any other words I have heard in my life. They pierced me to the heart. I had heard something terrible—too terrible to think of." Later his mother comforted him with the assurances of the immortality of the soul, but he had already experienced despair. If he could have been taught at that early age the transmutation of the golden red cherry leaf as it fluttered down, he would have realized that in the earth is a wonderful laboratory where old Caesar's body, no longer of use to him, would be changed into the elements of soil and air by a process as marvelous and more beautiful than the change wrought by the stroke of any fairy wand, so that nothing of the old body of the beloved dog would remain in the hole in the earth in which it was placed, but would, sooner than he could imagine, become a part of the free air and the growing plant and live again in the sunshine. It is for the parents and the Sunday-school teachers to reveal to the child the immortality of the soul, but it is the plain duty of the Nature-Study teacher to reveal to the child the beauty of the chemistry of decay, and the laws of physical immortality.

The Bulb to Alice

(with gift of tulip bulbs to a little girl)

T. D. A. COCKERELL

Yes, you may bury me, put me away,
Think I am dead, but I'll rise some day,
Rise from the darkness, into the light,
Though I slumbered long through the winter night,
Fragrant and lovely my flowers shall be,
And my joy in life shall be joy to thee;
So cherish me now in my duller days,
Hope with my hope to win the praise
Of all who, living upon this earth,
Are born again with the Spring's new birth.



The Editor's Web

Charles Smith is a ranchman in Wyoming, with a wife who, like him, believes in enjoying the beauty of life wherever it occurs and they have the spirit and imagination that enables them to make life interesting for themselves and others. They take photographs of the birds and animals which they find on the ranch and the country around it and they behold with unsealed eyes what the God of those great plains and mountains meant for his children to see.

Helen Murphy is a Doctor of Science and an investigator in biology and entomology who has earned the respect of other scientists in this field. She has taught at Cornell and at Colorado College but she enjoys research more than teaching and is at present in the Scrips Laboratory at La Jolla, California. However she is not so scientific that she cannot see and enjoy the common things she sees in the fields and woods; she is no laboratory blind-worm and we publish with pleasure her little skit on friend pig.

Millie Ruth Turner is a teacher of note in Pennsylvania. She is interested especially in the teaching of English but she holds an open mind toward the natural world which led her to take the very excellent course on Garden Nature-Study given by Dr. John D. Detwiler at the Cornell Summer Session. The adventures of Ferdinand and Columbus proved to be of breathless interest to the other pupils as we are sure they will to our readers. Miss Turner has the vision to see the dramatic quality in the life histories of our little brothers of the field and garden and the literary skill to portray them.

John J. Birch is a new contributor and we have never had the pleasure of knowing him. We trust he will sometime favor us again, for his story in this number is very interesting and full of information.

Interesting Neighbors—Oliver P. Jenkins, Emeritus Professor of Physiology, Stanford University. Calif. Illustrated 248 p. P. Blakiston's Son & Co. $1.50.

Professor Jenkins has been from the start a firm believer and an effective worker in the Nature-Study movement. One of the earliest and most helpful books published for the Nature-Study teacher was written by him in collaboration with Professor Vernon L. Kellog. Moreover, Professor Jenkins has reared a family of boys and girls who were trained to observe out-of-door life almost from the cradle, so he knows how to tell stories that interest children. The sixty-two stories forming this volume are about common things just as they should be; common, because the children see the common things oftenest and enjoy the most. The leaf cutter and carpenter bees, the caterpillars, mushrooms, toads, silk worms, wasps, butterflies, moths, dandelion, seeds, flowers and their adaptations for their insect visitors, pitcher plants and birds. All of these and many more are described in these charming stories. There are eighty-one pleasing and accurate illustrations by W. S. Atkinson. It is a valuable and interesting book, and we trust that thousands of children in America will enjoy it and have the privilege of owning it.

Plant Materials of Decorative Gardening. The Woody Plants. 2d edition revised. William Trelease, published by the author, Urbana, Illinois. 177 pp.

Four years ago Professor Trelease published this little book which slips into the coat pocket, and which contains enough scientific information about horticultural plants to fill an encyclopedia. It was published first as a help in teaching his own classes in the University of Illinois, but so many other teachers have found it of value that we have now this new revised edition. It contains keys of trees and shrubs, undershrubs and climbers, and these

are followed by a systematic arrangement of the plants with keys to the species under each genus. The more one uses it, the more remarkable it seems that so much of real information and help in identifying species could be condensed into such small space. The booklet is so pretty in its brown leather-like binding, with leaves outlined on it, that one would enjoy carrying it around in one's pocket even if one did not use it so constantly.

The Apple Tree. L. H. Bailey. 117 pp. Illustrated. The MacMillan Co. Price $1.50.

The Apple Tree which has figured in history and development of mankind since the Garden of Eden has at last found a worthy biographer. Certainly Professor Bailey has a wide knowledge of all apple trees, but what is more important, he has a love for the apple tree and an understanding which has found expression through his skillful pen in this little volume. The titles of the chapters show its scope. Where There is no Apple Tree; The Apple-Tree in the Landscape; The Bud on the Twigs; The Weeks Between the Flower and the Fruit; The Brush Pile; The Pruning of the Apple-Tree; Maintaining the Health and Energy of the Apple-Tree; How an Apple-Tree is Made; The Dwarf Apple-Tree; Whence Comes the Apple-Tree; The Varieties of Apple; The Pleasant Art of Grafting; The Mending of the Apple-Tree; The Apple Tree Regions; The Harvest of the Apple-Tree; The Appraisal of the Apple-Tree. Of all these interesting chapters, we confess a preference for the "Apple Tree in the Landscape." The orchardists have left to the artists the appreciation of the apple tree unpruned and uncultivated, and we are glad that Professor Bailey is an artist as well as a horticulturist for he has done full justice to the beauty of this useful tree. However, the volume is full of practical information concerning the care of the apple tree and directions for judging apples at the exhibition are carefully given. After reading the book, we are sure that all will agree with the author that "The Apple Tree is a living thing, not merely a something that bears apples."

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